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THE HOME OF

**finish**

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Page

CHEMICAL POLISHING OF METAL PRODUCTS.....	By Russell L. Deubner	19
A PHOTO STORY OF ENAMEL HANDLING FACILITIES.....	By Dan J. Cherry and Robert J. Baker	23
ANOTHER WORKABLE PROGRAM FOR REDUCING SHIPPING DAMAGE.....	By R. E. Heine	29
SPRAYING TECHNIQUE FOR PORCELAIN ENAMELS AND SYNTHETIC FINISHES.....	By M. L. Pouilly	31
PICKLING SHEET STEEL PRIOR TO FINISH APPLICATION.....	By T. F. O'Brien	39
ADHERENCE OF GLASS TO METAL.....	By Joseph A. Pask	41

### Features

THE FINISH LINE—An Editorial.....	17
A NEW TREND IN DEPARTMENT STORE ARCHITECTURE.....	36 & 37
ENAMELED ART PRIZES WINNERS AT 14th NATIONAL SYRACUSE EXHIBITION	58

### Industrial News

EIGHTEENTH ANNUAL MEETING OF PORCELAIN ENAMEL INSTITUTE.....	33
SIXTH ALL-INDUSTRY REFRIGERATION AND AIR CONDITIONING EXPOSITION HELD IN ATLANTIC CITY.....	42
INDUSTRY NEWS AND PERSONALS.....	45
STOVE MEN MEET IN CINCINNATI DECEMBER 5, 6 AND 7.....	46
CENTRAL ENAMELERS MEET IN CLEVELAND.....	47
PACIFIC COAST ENAMELERS MEET AT ACS REGIONAL CONVENTION .....By Malden Grange Bishop	50
STEEL FOUNDERS SOCIETY HOLDS NATIONAL TECHNICAL AND OPERATING CONFERENCES.....	59

### Miscellaneous

NEW SUPPLIES AND EQUIPMENT.....	54
NEW INDUSTRIAL LITERATURE.....	54
ADVERTISERS' INDEX.....	72
CLASSIFIED ADVERTISING.....	72

**FROM RAW METAL TO FINISHED PRODUCT**

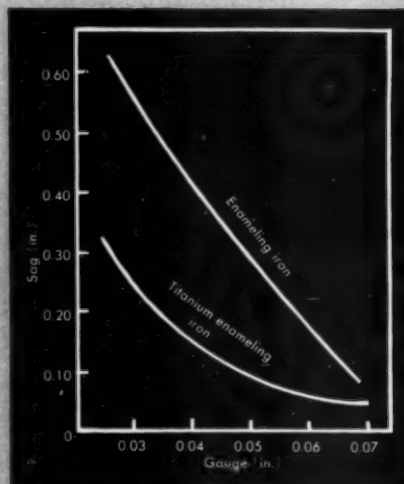
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Improved Sag Resistance  
makes Thinner Gauges Practical

# TITANIUM IRON for vitreous ENAMELING

The improved sag resistance of Titanium-bearing Enameling Iron makes it possible to avoid firing-distortion with lighter gauge sheets. This is a worthwhile economy that enamellers are using to advantage. In addition to sag and warp resistance, Titanium Enameling Iron, containing sufficient titanium to stabilize all the carbon, offers other desirable properties:

- 1 GROUND COATS ELIMINATED:** Under proper shop conditions, cover coats may be applied directly to the base metal. These thin opaque coats reduce the hazards of chipping and breaking. Adhesion is excellent.
- 2 FISHSCALING AND BOILING REDUCED:** During years of research and production, not one case of fishscaling has been reported. Blisters in the finished enamel are also eliminated.
- 3 PRODUCTS MORE ATTRACTIVE:** In fabricated shapes warping, wrinkling and stretcher strains are avoided because of the increased sag resistance and excellent drawing qualities of Titanium Enameling Iron.



The Titanium Alloy Mfg. Division developed this new enameling process and produces the titanium alloy used in the manufacture of this enameling iron. For samples see your steel supplier. Detailed technical information may be obtained from our field engineers by writing to our New York Office.



TAM is a registered trademark

## TITANIUM ALLOY MFG. DIVISION NATIONAL LEAD COMPANY

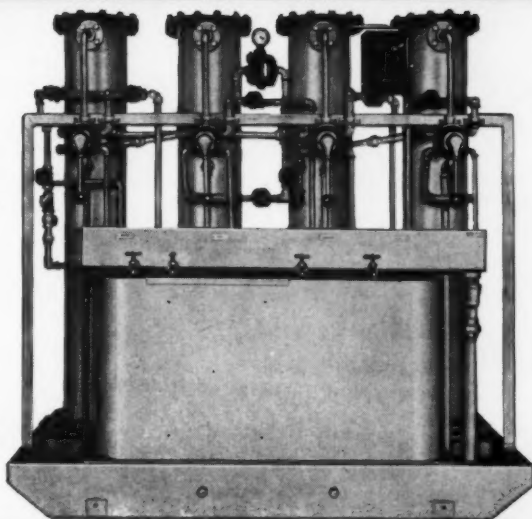
Executive and Sales Office: 111 BROADWAY, NEW YORK CITY • General Offices, Works, and Research Laboratories: NIAGARA FALLS, N. Y.

*For*  
**Mill Room ASSURANCE**  
 That the "SLIP"  
 is Always RIGHT

These ion-exchange demineralizers deliver the chemical equivalent of distilled water by simply passing water through ion-exchange resins. All dissolved mineral salts are removed without the use of any stills, heat, or steam. No cooling water is required and there are no scale formations. And the cost of this demineralized water is only a few cents per 1000 gallons compared to the several dollars for distilled water or steam condensate.

*Model L-200 Four-Bed Industrial Water Demineralizer for a nominal flow rate of 200 gph. Other standard models available with capacities of 5 to 1000 gph. Special units of any capacity engineered to requirements.*

## INDUSTRIAL'S NEW WATER DEMINERALIZERS



*For*  
**Dependable Results in  
 Solution Clarification**

In production filtration here are some points to check. Compare these construction and operating features of Industrial's filters.

Industrial's filters are conservatively rated on capacity. Compare the filtration area, the sludge holding capacity of the filter chamber, and the pump characteristics. All these factors govern the capacity of the filtering system. The filter cloths in connection with filter aids provide efficient, low-cost filtration in either continuous or intermittent service.

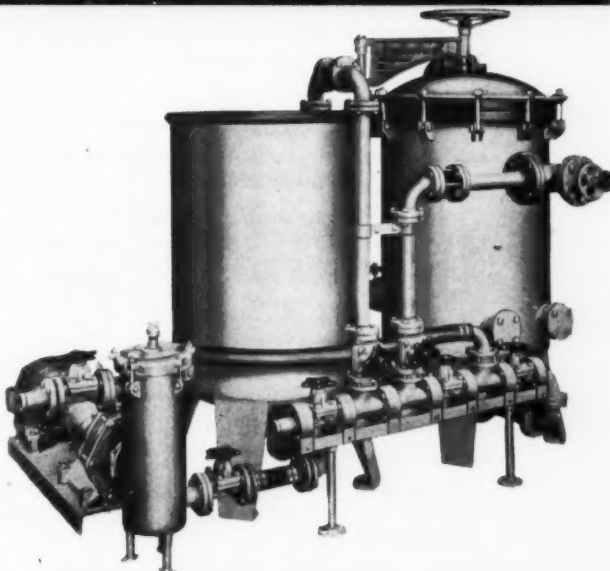
The air wash cleaning feature does not require any dismantling of the filter or removal of the cover. Industrial's filters have operated for months without opening—opening is required only for replacing filter cloths or for periodic inspection. This feature is a great time and labor saver.

★ *Write for full information  
 and recommendations*

## INDUSTRIAL FILTER & PUMP MFG. CO.

1627 West Carroll Avenue • Chicago 12, Illinois

## INDUSTRIAL'S FILTERS AND FILTERING SYSTEMS



*A typical Industrial Stationary Filter System. Standard models—portable and stationary types—are available in capacities of 100 to 15,000 gph. Special filters are engineered to meet unusual requirements.*

FILTERS  
 Pressure Type

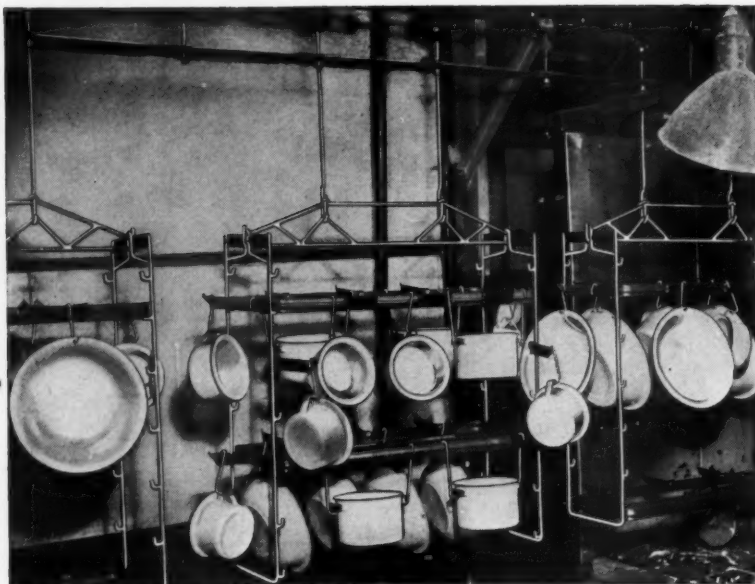
PUMPS  
 Centrifugal

CORROSION TESTING  
 APPARATUS  
 Salt Fog  
 Humidity

RUBBER DIVISION  
 Vulcanized Linings • Molded Products

WATER  
 DEMINERALIZERS

**PRODUCTION UP  
FUEL COSTS DOWN  
MAINTENANCE CUT..**



## **When Moore Enameling installed Strohecker all-Inconel burning tools**

Moore Enameling & Mfg. Co. of West Lafayette, Ohio, had been using burning tools that weighed about 67 pounds each, and required considerable maintenance.

At least once a week, each tool had to be thoroughly wire-brushed to remove loose scale that might damage ware finishes.

Recently, Moore Enameling changed over to welded wrought-Inconel\* tools. The new tools weigh only 33 pounds each... a weight saving of approximately 34 pounds over the old ones.

Moore furnace men found that in addition to getting faster, more even ware heating with the new tools... *they saved an estimated 30% on fuel. Maintenance and upkeep savings have been considerable... the wrought Inconel tools needed no wire-brushing, even after two months of continuous use.*

Like other leading fabricators, Strohecker,

Inc. chose Inconel as the standard metal for this equipment because of Inconel's outstanding, high-heat characteristics.

Inconel is highly resistant to destructive oxidation, corrosion, heat-cracking, and embrittlement even at constant temperatures as high as 2000° F. Inconel's tightly-adhering oxide film does not scale away to ruin expensive finishes. And welds in Inconel are as heat-resistant as the alloy itself... assurance of long life for fabricated fixtures.

For help in solving your high temperature corrosion and oxidation problems, write to Inco's Technical Service Department.

\*Reg. U. S. Pat. Off.

• • •

*For further information about Strohecker wrought Inconel burning tools, write to:*

**STROHECKER, INC.  
Enon Valley, Pennsylvania**



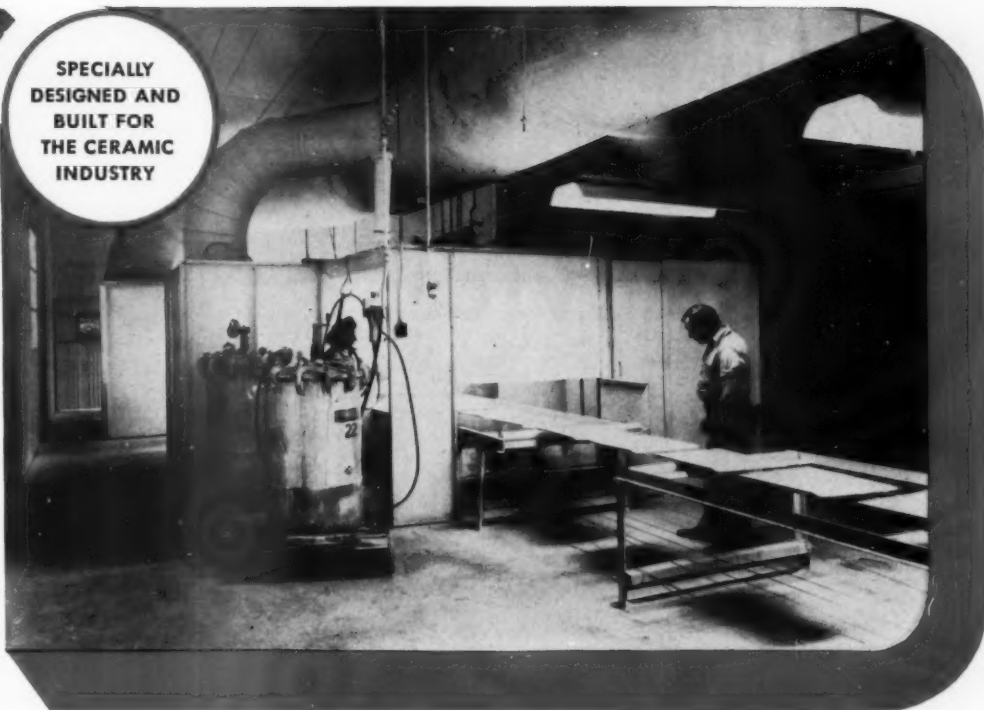
**THE INTERNATIONAL NICKEL COMPANY, INC.**

67 Wall Street, New York 5, N. Y.

**INCONEL\***...for long life at high temperatures



SPECIALLY  
DESIGNED AND  
BUILT FOR  
THE CERAMIC  
INDUSTRY



## Here are *3 ways* to lower costs

You'll get fewer rejects and better finishes as well as lower cost when you install DeVilbiss Complete Finishing Systems. Here's why . . .

1. Over 99% of the expensive over-sprayed solids are recovered by the efficient DeVilbiss Centrifugal Water Wash Spray Booth. Maintenance of the booth is less because there are no moving parts exposed to wear.
2. You get no contamination of high-quality vitreous finishing materials in a DeVilbiss Pressure Feed Tank. The tank is made of wear- and corrosion-resistant metal that's unaffected by any finishing material.
3. DeVilbiss ceramic-materials spray guns are specially made to withstand wear and corrosion. Because of this, they retain their high efficiency and produce better results over longer periods of time . . . spray at lower pressure and save materials.

Ask your nearby DeVilbiss engineer to show you how a DeVilbiss Complete Finishing System can make your products and your profit picture look better. Or write to

**THE DEVILBISS COMPANY • Toledo 1, Ohio**

Canadian Plant: WINDSOR, ONTARIO

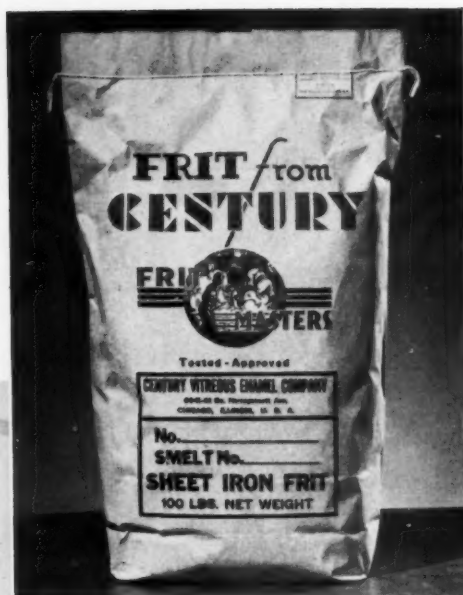
# DEVILBISS

*means Quality in all four . .*



SPRAY EQUIPMENT  
EXHAUST SYSTEMS  
AIR COMPRESSORS  
HOSE & CONNECTIONS

# LABORATORY SERVICE *plus* FIELD SERVICE



**F**OR years Century has operated a completely equipped laboratory both for the formulation and testing of porcelain enamel frits and for testing production samples of finished porcelain enameled work. This laboratory service is a valuable aid to Century Customers.

Century now offers a complete customer field service which is immediately available to all Century customers. The personnel of this field service organization represents years of experience in practical enameling and includes specialists in pickling, milling, dipping, spraying, firing—in fact all important operations in an enameling plant.

Add to these services the fact that every single Century frit is time-proved in our own porcelain enameling plant before it is released for sale to frit customers and you

will see why many of the country's outstanding porcelain enameling plants depend on Century for their frit requirements.

If you haven't tried Century frits, we suggest an early demonstration under your own plant conditions. Write or 'phone today.



**CENTURY VITREOUS ENAMEL COMPANY, 6641-61 S. Narragansett Ave., Chicago 38, Ill.**

*Detroit Brass Introduces...*

**THE "DB"  
UNIVERSAL  
BURNER CAP**



***For All Appliance Gases***

**F**or greater efficiency, more attractive appearance and universal application, Detroit Brass introduces the "DB" Universal Burner Cap. The "DB" Burner Cap is designed to accommodate bottled (LPG), manufactured, natural and mixed gases. Thus it is universal. The new cap is available in both standard and giant burner sizes.

**T**he good-looking "DB" Burner Cap is of smart design . . . it will add to the attractiveness of your appliance. It has a high polish finish. It is easy to keep clean—there are no sharp corners to collect soil.

**A** product of our research and experimental laboratories, the new universal cap is presented after extensive study and test with all types of gases and under varying conditions. We believe it will satisfy your most exacting requirements for burner caps.

**T**he "DB" Universal Burner Cap is already in production and prompt deliveries are assured. We will be pleased to forward a sample for your inspection.

GAS VALVE DIVISION

**DETROIT BRASS and  
MALLEABLE WORKS**

**DETROIT 9, MICHIGAN**

**VALVES**  
THE HEART OF YOUR APPLIANCE  
*Be Sure They're The Best  
Be Sure They're Detroit Brass*



**VALVES FOR ALL GAS APPLIANCES**



## with **LOCKE BRICKS and BALLS**"

**SAVINGS UP TO 25%** on grinding operations is a familiar story to enamellers who standardize on Locke's new, improved Bricks and Balls. Try them. Chances are you'll see marked improvement in your grinding operations . . . for three reasons:

- 1 FASTER GRINDING**—Locke Grinding Balls are handmade. This gives them a quick-acting irregular surface and a compact body that resists wear—keeps balls heavier, longer.
- 2 LONGER LIFE**—Locke Bricks and Balls are more resistant to abrasion and breakage because they're completely vitrified—have no laminations or voids.
- 3 LESS CONTAMINATION**—Made of special wet-process porcelain (originated by Locke in 1893), Locke Bricks and Balls are pure white and non-porous . . . do not require costly hand scrubbing . . . wash easily with a simple hosing.

*Next time you need bricks and balls, specify Locke. Available for all standard mills.*

MEMBER: PORCELAIN ENAMEL INSTITUTE

**LOCKE**  
INCORPORATED  
BALTIMORE • MARYLAND

# LOCKE **BRICKS and BALLS**

**BETTER MADE**...because they're backed by Locke's 55 years experience with wet process porcelain **PLUS** the product control and development facilities of the new Fred M. Locke Research Laboratory, one of the world's finest and largest!



SAFE TRANSIT

SAFE TRANSIT

SAFE TRANSIT

# ENGINEERED PACKAGING REDUCES SHIPPING LOSSES



To meet the tests for packaged products outlined in the National "Safe Transit" program, you will need to study your packaged products "from the ground up." Then, you must be sure of a properly engineered "package."

Our modern research laboratory and our experienced packaging engineers are at your service, without obligation, to assist in pre-checking and for any research work that may be required.

We manufacture all types of wooden boxes and crates and are therefore in position to consult with you without prejudice and to recommend the best package for your product from the standpoints of quality, shipability, and cost.

Be sure to protect those valuable finished products with the right box or crate for "Safe Transit."



**NAILED OR HINGED CORNER**  
**PLYWOOD      CRAVENEER      WIREBOUND**  
**CLEATED CORRUGATED**  
**BOXES OR CRATES**

## CHICAGO MILL AND LUMBER COMPANY

33 South Clark Street

Chicago 3, Illinois

Plants at: Helena, Ark. • Greenville, Miss. • Tallulah, La. • Rockmart, Ga. • Chicago, Ill.

# PORCELAIN ENAMEL INSTITUTE, INC.

1010 VERMONT AVE. N. W., WASHINGTON 5, D. C.

## Seven Reasons for P. E. I. Membership

1. MARKET DEVELOPMENT — individual counsel and guidance. Industry publicity and advertising.
2. COMMERCIAL RESEARCH — location, investigation and reports on new and potential markets.
3. SHOP PRACTICES FORUM — annual forum for plant men. An immeasurable aid to better quality production at lower cost.
4. PRODUCT STANDARDS — development of practical test methods and test equipment. Specifications for performance requirements.
5. PROCESS DEVELOPMENT — studies and reports on the practicability of technical developments for improved efficiency in plant operation.
6. SALES MANAGEMENT CONFERENCE — annual clearing house for advanced selling and promotion techniques.
7. NATIONAL SAFE TRANSIT COMMITTEE — a national cooperative program for the reduction of packaging and shipping losses.

***If you operate a porcelain enameling plant***

***in any country***

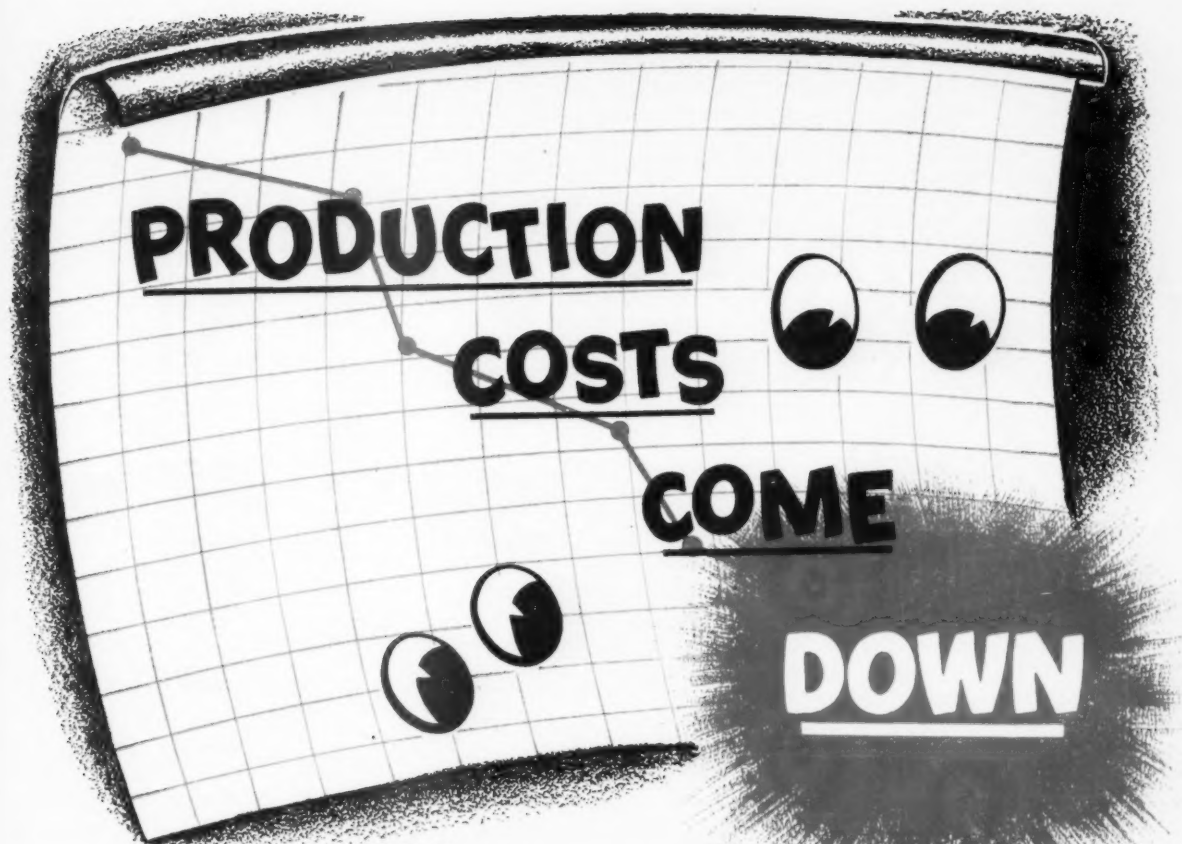
***you should belong to the P. E. I.***

Operators of porcelain enameling plants in any country can benefit from membership to an extent far beyond the modest membership fee.

Plant operators in the U.S.A. who have enameling facilities should consider P.E.I. membership a must — for the benefits it offers to management, sales and advertising departments, and plant operating men. Facts on enamel processing, market information and selling methods are yours, as a member.

**It will pay you to "join up." Apply now for membership.**





## —WHEN OHCO CERAMIC PRODUCTS WORK FOR YOU!

Production costs are sometimes hard to control. They go up . . . they go down—and not always when you expect them.

Here's one sound recommendation which 5000 plants have followed to reduce production costs . . . let OHCO ceramic products work for you . . . they're proven production cost-cutters!

Definite facts back our claim:

OHCO ceramic products are laboratory con-

trolled and tested for the most rigid requirements.

5000 consistent customers are now realizing reduced production costs by using OHCO products.

58 years of specialized ceramic know-how in constantly producing the best.

Insure profitable plant operation with OHCO ceramic products—Call a Hommel Engineer for complete sound engineering advice. No obligation. Write or Wire today.



### Laboratory Controlled Production of Ceramic Supplies

- FRIT for Steel, Cast Iron or Pottery
- CERAMIC COLORS
- CHEMICALS
- BRONZE POWDERS
- METAL POWDERS
- SUPPLIES
- EQUIPMENT

Our Technical Staff and Samples are available to you without obligation. Let us help you with your problems.

*World's Most Complete Ceramic Supplier*



# "Be Canny"

**C**ABINET AND TABLE MANUFACTURERS—when your new product goes from executive mind to drawing board genius, insist upon the advantages of Porcelain Enamel. It has the beauty and durability which together increase the saleability of your product. It is the finish most resistant to heat, cold, scratching, acids . . . in fact, all the rough wear and tear your cabinet and table tops must withstand in use.

Recently, we have developed die equipment which is unique in the industry! We can make almost any size top with  $1\frac{1}{2}$  inch and  $\frac{5}{8}$  inch radius. We can also make tops with either 1 inch or  $1\frac{1}{2}$  inch depth of flange. No longer will it be necessary to attach linoleum, plastic or other inferior splashers to your tops, either—you can buy porcelain enamel tops from us with an integral splasher, and you'll be surprised at the low cost.

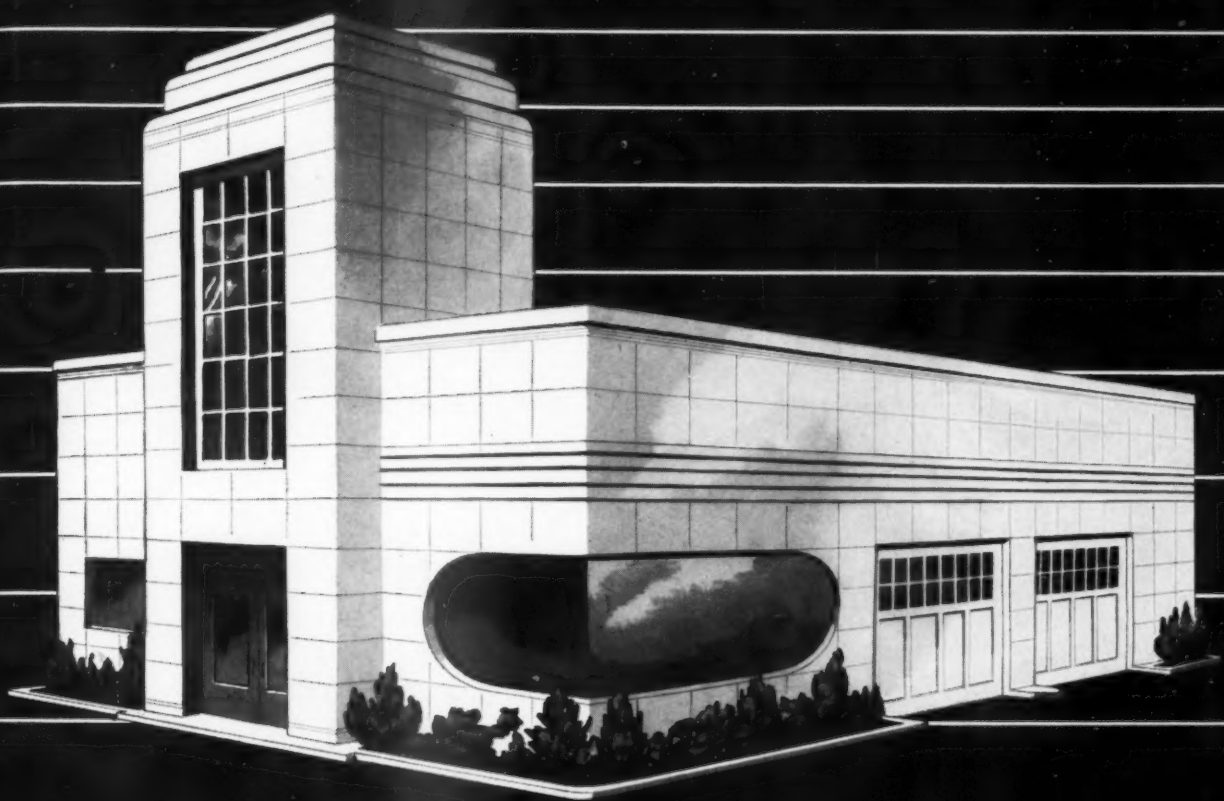
Save yourself real money! Don't go to the expense of forming dies for your tops until you check with us. It is very possible that we will become a really valuable friend.

*Plan...  
for the Lifetime  
Finish*

## VITREOUS STEEL PRODUCTS INC.

BOX 1791, CLEVELAND 5, OHIO (Factory at Nappanee, Ind.)





FOR A FINER ENAMELING BASE

# Vitrenamel

● In U·S·S Vitrenamel, enamellers have found the ideal base metal for all porcelain enameling jobs. Vitrenamel is consistently uniform in composition, surface finish, and forming qualities.

For dependable steel sheets, for an increased percentage of OK's on the inspection line, specify U·S·S Vitrenamel porcelain enameling sheets by name. For complete information, write to the U·S·S office nearest you.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH AND CHICAGO  
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS  
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL



*Merry Christmas*  
*Happy New Year*

As we face the confused and sobering  
uncertainties of the world today, may  
we find new joys and rejoice in happy  
memories throughout the Christmas  
season,—and approach the New Year  
with renewed hope and confidence.

**CHICAGO VITREOUS  
ENAMEL PRODUCT CO.**  
**CICERO 50, ILL.**

*Exclusive representative  
for the Enamel Industry*

**MCDANEL**  
**REFRACTORY PORCELAIN CO.**

**BEAVER FALLS, PA.**

**Makers of QUALITY Porcelain Products**

# THE Finish Line

**THE ART OF SHOWMANSHIP**—has always played an important part in all phases of advertising and selling.

It might seem natural for a magazine publisher to feel that magazine advertising is the most effective means of broadcasting a product story and assisting the selling force. The Editor or Publisher would be short-sighted who could not recognize the potential power of other educational and promotional methods. We're thinking now of product displays and demonstrations—and here the art of showmanship plays an important part.

## Two good shows

We have enjoyed the opportunity recently of observing two very excellent displays and demonstrations, both very well conceived and both unquestionably effective in presenting a clear and convincing product story.

The first was the story of "Fiberglas" as presented before some two hundred leading architects and representatives of the press in Chicago.

The second was the story of "Plexiglas" and its uses in the fields of architecture and advertising display (signs), as viewed in Cleveland with architects and leaders in the sign and display field.

## The magic glass "thread"

The average appliance manufacturer will be thinking of "Fiberglas" as the fluffy white material used for insulating stoves, refrigerators, etc.

What the Owens-Corning Fiberglas Corporation's traveling exhibit dramatizes is that within the comparatively few years of the product's existence the material, as a result of research, now reaches into all kinds of diversified applications.

There were literally dozens of applications on display varying from attractive *fireproof* curtains for m'lady's bedroom to a special covering for underground transmission lines or from thread composed of hundreds of tiny glass fibres to rigid insulation sections with excellent structural strength.

There were too many instances of showmanship and dramatization in the demonstration for detailed description but two of them can be readily visualized.

A square section of heavy gauge steel was placed in an open "frame" and a guest invited to hit it with a

heavy steel hammer. With a few blows the steel sheet was permanently deformed. The guest was then invited to direct the same blows to a thin sheet of Fiberglas reinforced plastic which showed no resulting deformation.

A quart of ice cream was wrapped in Fiberglas insulation early in the program and placed in a hot oven with a freshly made pie. Thirty or forty minutes later the pie was removed perfectly baked and the ice cream when taken from the same oven and the insulation removed was still too hard to cut with a spoon.

Those are examples of the art of showmanship.

## From bomber "noses" to store fronts

The Rohm & Haas exhibit of Plexiglas depended more on beauty, light, design and color for its effectiveness.

This material which was used so extensively in aircraft production during the war can now be seen in products varying from jewel-like automobile insignia buttons to show cases and from large colorful translucent advertising displays to store fronts for exclusive shops.

In the exhibit the interested architect or buyer is not called upon to view a material in its raw state. He sees the *results* of the use of the material in the forms in which he can use it.

## No displays for sale

We have no displays for sale at *finish*, nor do we own stock in any display companies.

It is our hope that in briefly referring to these examples of showmanship, as a part of the overall sales and advertising program, that more *finish* readers may come to recognize the importance of *taking the product to the buyer*.

Where audiences of sufficient importance can be successfully assembled to make the cost of effective exhibits practical and resultful they can form an important link in the merchandising chain of any raw material or finished product. The medium can be effectively used by individual companies or by associations on an industry-wide basis.

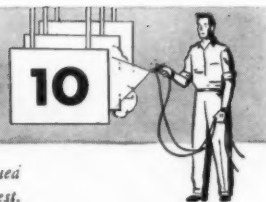
*Dana Chase*

EDITOR AND PUBLISHER





## Enameler's Data Sheet No. 10



*An informative series on titanium-bearing killed steel for the enameling industry. Issued monthly by Inland Steel Company. Reprints of all data sheets are available upon request.*

# COSTLY ENAMEL-SURFACE DEFECTS MINIMIZED WITH TITANIUM-BEARING SHEET STEEL

The aim of the enameling industry for many years has been to obtain a finished coating having a total thickness no greater than that of organic (paint) finishes. This would be anywhere from .002 to .004 inches.

Attaining this goal precludes the use of ground or base coat enamels, at least those in use at present, since a satisfactory ground coat, itself, is about this thickness. It also requires the use of a



*J. H. Nead, Manager, and F. R. Porter, Ceramic Engineer, both of Inland's Metallurgical and Inspection Department, check the smooth, even quality of the single coat of enamel on a TI-NAMEL stove drawer panel.*

base metal comparatively stable when in contact with enamels and enameling reaction products at enameling temperatures. Titanium enameling steel was developed to meet this need. Standard enameling iron and steel are too reactive at enameling temperatures to permit attaining the above goal.

### Titanium Stops Reboiling

Titanium enameling steel does not reboil, and there is a minor amount of

what may be termed primary boiling when firing an enameled part fabricated from titanium steel. The usual black-specking and pitting associated with boiling are also absent.

The non-reboiling characteristic is of importance. Decalcomanias and ceramic ink printing can be fired without the occurrence of enamel blistering and black-specking which sometimes occur with the usual enameling iron. Also important, is that for reoperation a complete additional coating is not required—just spot spraying of the area in question.

Copperheading does not occur when titanium enameling steel is used, since there are no reactive areas in the steel to cause this defect.

It must be stressed that the above statements hold true only when good cleaning and pickling practice is followed. Enamel blistering, black-specking and pitting can be caused by inadequate cleaning and rinsing. The rinsing steps following pickling and nickeling are vitally important, particularly with reference to the satisfactory application of single white coats directly to the metal.

Titanium enameling steel does not fishscale, either. While this enamel defect is not as prevalent in enamel shops

now as in past years, it does appear from time to time with the use of regular enameling iron and steel—frequently to a troublesome degree.

### Service Life Lengthened

Tests reported in the Journal of the American Ceramic Society have shown that crazing and chipping due to heat or thermal shock are drastically reduced as total enamel thickness decreases. Chipping caused by impact or torsion is also greatly decreased—whether caused in assembly, transit, or use of the product—because of the higher stresses really thin enamel coatings can withstand.

Frit manufacturers have developed cover coat frits so highly opaque that satisfactory reflectance can be obtained with as light an application as twenty grams per square foot—a coating approximately .004 inches in thickness. The thin enamel coatings possible on titanium steel lengthen product life considerably, since these coatings are highly resistant to in-use surface defects such as crazing and chipping.

Future Enameler's Data Sheets will further discuss Inland TI-NAMEL titanium enameling steel. Write, if you would like additional information on this superior base metal.

**Inland Steel Company, 38 S. Dearborn St., Chicago 3, Ill.**

**SALES OFFICES:** Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul

**OTHER PRODUCTS:** Bars • Sheets • Strip • Structural Plates • Tin Plate • Floor Plate • Piling • Reinforcing Bars  
Rails • Track Accessories • Pig Iron



# INLAND TI-NAMEL

Reg. U. S. Pat. Off.

**TITANIUM-BEARING KILLED STEEL ENAMELING SHEETS**



# Chemical polishing of metal products

this development is in its infancy but it is one which manufacturers of appliances and other metal products will want to keep under observation

*By Russell S. Deubner* • RESEARCH ENGINEER, BATTELLE MEMORIAL INSTITUTE, COLUMBUS, OHIO.

**M**ETAL products can be given a bright, reflective surface without mechanical or electrical operations by a new process recently developed at Battelle Institute.

The product to be finished is merely dipped into a chemical solution. When withdrawn a few minutes later, it is polished to a smooth, highly reflective luster.

While the work to date has been done primarily on a variety of small parts, varying from safety pins to flashlight cases, there is every indication that the process might be adaptable to components for the major appliance and allied metal products industries.

The process has two outstanding advantages. The first is the non-etching character of the solution. Parts have been polished to maximum luster and then left immersed until the metal dissolved to paper thinness with no evidence of etching or loss of reflectivity.

The other advantage of the process in production is its simplicity. Items of intricate form can be quickly polished by dip treatment. The surface obtained may serve as the final finished surface or as a base for subsequent plating. In practice, it has been found that chemical polishing—as the process is called—may eliminate from one to four or five production steps in the finishing of a metallic product. This means a reduction in finishing costs as great as fifty per cent.

## Five buffing operations eliminated

Chemical polishing is too new to have permitted discovery of all its

potential uses and its limitations. However, it has been used commercially on several products with success. In the case of a luggage lock manufacturer, the process has eliminated five buffing operations in finishing locks and hasps. A savings of

about 65 dollars per 1000 locks and hasps has resulted.

Metals that can be chemically polished successfully include brass, copper, nickel-silver, Monel, nickel, and aluminum. The action in each case is a true polishing action and the

*A spoon which has just been polished experimentally by dipping in a chemical polishing bath is rinsed prior to inspection of its surface.*





*The automobile thermostat (top right) has been dipped into a chemical polishing bath. The thermostat (top left) has not been polished. The polished inverted brass cup (left below) reflects its background and surroundings, in contrast to the general lack of reflectivity of the unpolished cup.*

reflective surface obtained is in the polished base metal.

#### **For intricate shapes and hard-to-polish parts**

The need for a simple immersion process for producing a reflective surface has been recognized for some time. Many metal stampings are of such intricate shape or such a size that they are not only difficult, but often impossible to polish by wheels. The so called "electropolishing" process may be used to polish some of these stampings, but it cannot be adapted readily to many articles. Others do not require the quality of luster obtained by electropolishing. Other methods of polishing intricate parts, such as tumbling and bright dipping, are not always successful because of scratching or etching. Chemical polishing makes it possible to finish intricate shapes with ease and without etching or other damage to the surface.

Since no electrical current is used in the process, chemical polishing offers great flexibility in the production line. Depending on the size and shape, the parts may be suspended from wires or supported in baskets. With some articles, the polishing

solution may possibly be used in revolving barrels. Where it is desired to move the work on a conveyor belt, spraying of the work with the solution is another possibility.

#### **Time element—ten seconds to ten minutes**

Chemical polishing baths are mixtures of acids. They operate at temperatures from room temperature to 200 degrees Fahrenheit. At the lower temperature, action of the bath is slower, and longer immersion time is required. Immersion periods vary from 10 seconds to 10 minutes, depending on the initial finish of the surface being treated, the final finish required, and the operating temperature of the bath.

Following the polishing dip, the work is rinsed and dried. If it is desired to plate over the chemically polished surface, this may be done without further treatment of the surface.

The process has been used on picture frames to prepare the surface for subsequent nickel and gold plating.

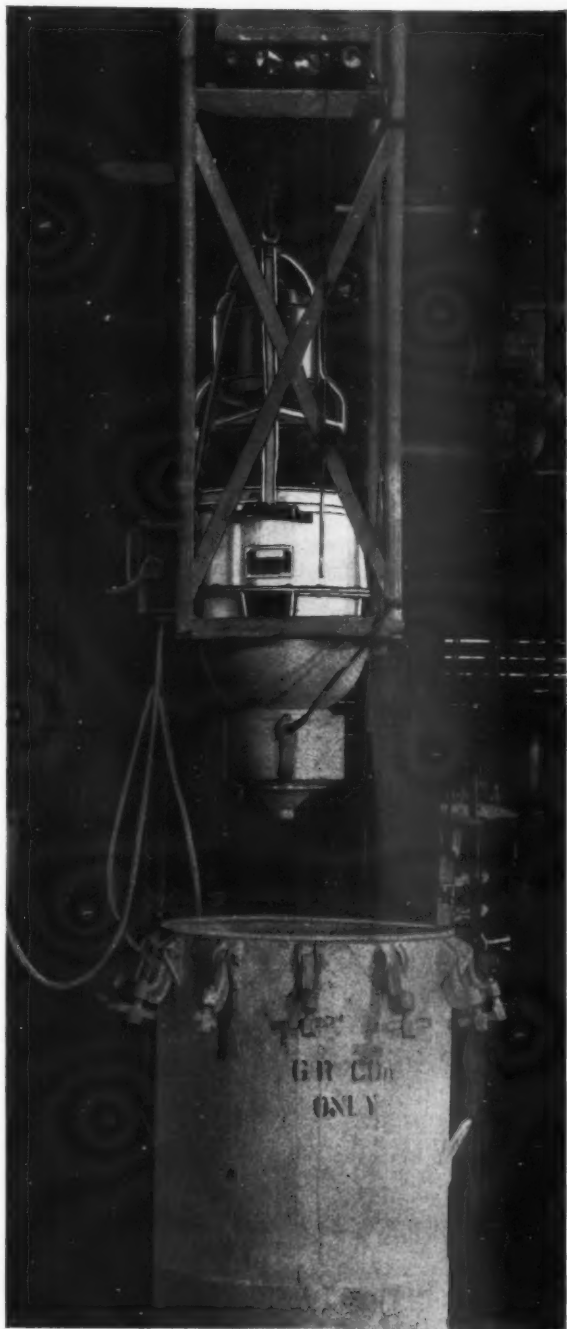
Brass-plate assemblies have been chemically polished to produce a surface suitable for subsequent copper and nickel plating. Brass rings,

which are normally bright dipped and tumbled prior to receiving a flash gold plate, can be chemically polished in bulk in a basket to obtain a satisfactory finish in 90 seconds. Brass fireplace screen frames, after receiving a 2-minute chemical polishing treatment, can be color-buffed to a mirror-plane surface, the treatment eliminating all other wheel polishing operations normally used.

Brass pocket flashlight cases, brass screws, brass compacts, safety pins, nickel laundry tags, nickel-silver clips used in the dental industry, Monel tubing and spinings, pencil ferrules, and brass license-plate frames are other items that have been treated by the process to acceptable appearance.

Copper-plated steel parts, such as bumper guards for automobiles, have been successfully chemically polished. In such cases it is necessary that the copper plate be thick enough so that it is not cut through to the steel. Appliance parts with a copper underplate usually carry 0.0003 to 0.0005 inch of copper. Where the copper plate is fine grained, this may be sufficiently thick for chemical polishing.

# Rotospraying...



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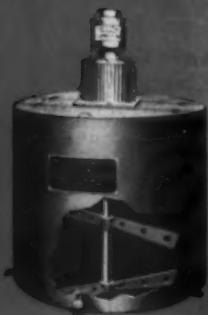
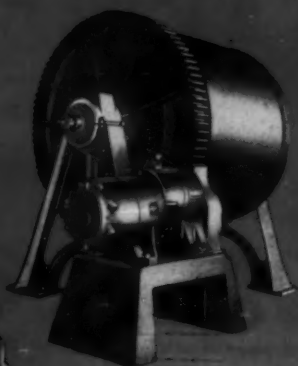
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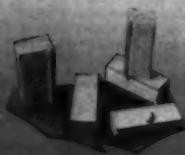
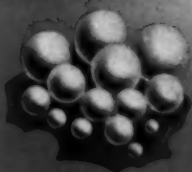
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EQUIPMENT  
IN THE  
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MONTREAL



# A photo story

## of enamel handling facilities

the last word in materials handling, liquid enamel storage, and pipe line delivery to point of application

*By Dan J. Cherry* • SUPERVISOR OF ENAMELING OPERATIONS, AND

*Robert J. Baker* • GENERAL FOREMAN, PICKLING AND ENAMEL PREPARATION, FRIGIDAIRE DIVISION, GENERAL MOTORS CORPORATION, PLANT 2, DAYTON, OHIO



It will be the purpose of this photographic story and brief description to completely cover the preparation and handling of milled enamel at the Moraine City plant, Frigidaire Division, General Motors Corporation, where porcelain enamel is used for the finishing of electric ranges, automatic washing machines, electric refrigerators and other Frigidaire products.

The description will follow the enamel from the time the frit is unloaded until the liquid enamel is sprayed or dipped on the fabricated steel parts.

Frigidaire has done a great deal of research work in connection with the handling of these materials and particularly the handling of the liquid enamel from storage to point of use.

### Frit handling

Frit and raw materials arrive both by car and truck for unloading at a common loading dock. The frit is loaded on pallets of 3000# capacity (proportionately less for lighter materials). These are a standard 3' x 5' pallet.

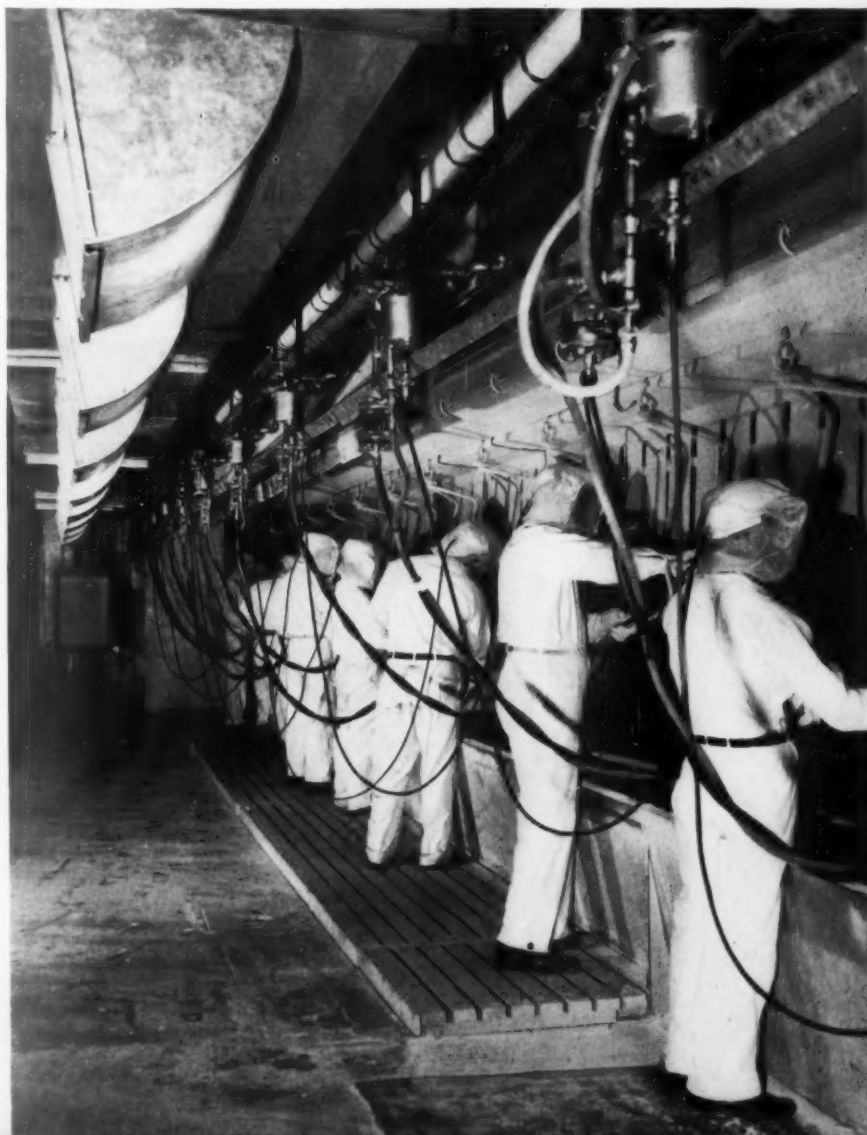
Fork lift trucks are used to transport the material to an elevator at the rate of two pallets per load or in other words—a 3 ton load. The lift is hydraulically operated.

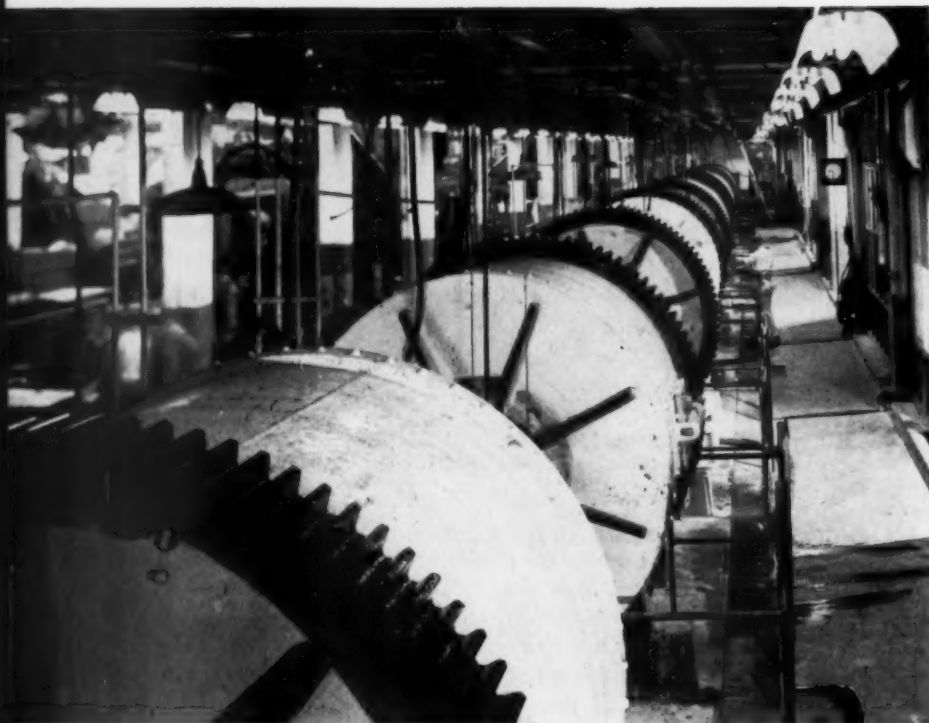
*Photo shows 8 sprayers on liners spraying off 3" diameter transformer tube fed by single 1 1/4" tube from mill room. Note use of welded tubing & rubber-diaphragm valves on fluid lines.*

After the pallets reach the second floor frit storage room by elevator, an automatic monorail transport system is used for handling the materials within the storage room. This system consists of an electric crane which

travels to predetermined locations in the room and can be automatically dispatched to any of the stations by the operator.

Mill batches are loaded in steel hoppers holding 1800# or a one-





*Left: Photo shows a general view of the ball mills at Frigidaire's Moraine City plant.*

*Left below: Showing mill being loaded with a loading chute, water hose and dust arrestor in position.*

*Below: Operator is shown resetting revolution counter used to determine approximate milling time.*

half mill batch. The hoppers are handled both by overhead crane and on integral casters depending on the distance to the mill being loaded. A portable dust collector is used over the hopper when it is being filled.

The mill loading chute enters the mill through a specially designed head. The head also provides an out-

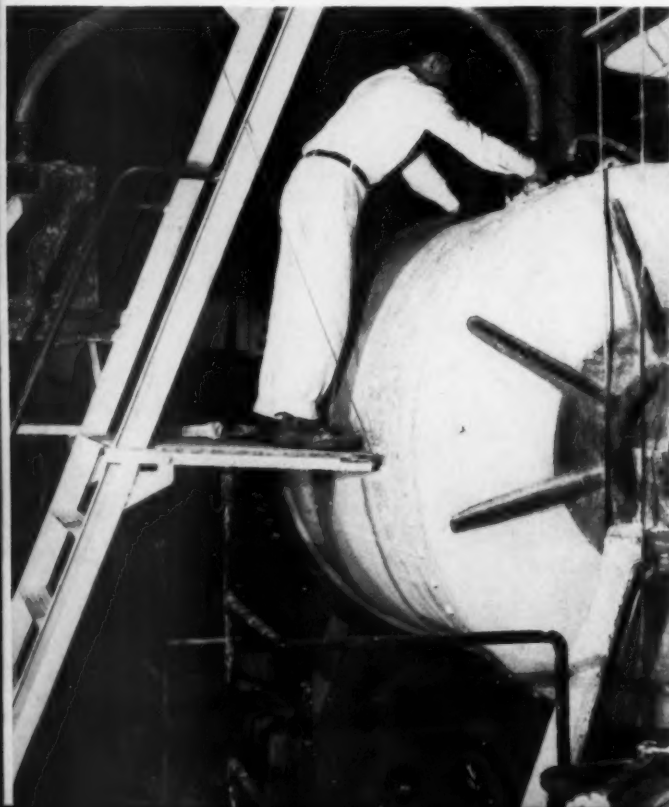
let for a dust collector tube and for water connection. The dust collector and the mill loading platform are mounted on a track paralleling the complete line of mills. The platform can be retracted when not in use to give clearance for mills.

The production mills at Frigidaire consist of fourteen mills, varying

from 1000# to 3500# capacity. Individual, reversible drive motors with four-stage starters are used.

All mills are equipped with revolution counters for the determination of approximate milling time. Exact milling time is determined by standard fineness check.

Mills are equipped with water



*Below: Sample of enamel is removed from mill for testing before milling is approved for unloading.*

*Right below: Mill is connected for unloading. Also, for demonstration only, sprays for water-cooling mills are shown in operation.*

*Right: Testing enamel for fineness in the millroom laboratory.*



spray for cooling during operation.

Unloading of mills is accomplished by air with a maximum of ten pounds pressure as standard. A pipe line filter is used between the mill and the pump used to elevate the enamel to the overhead storage system. This filter keeps any coarse particles out of the system. Enamel is pumped

through 2" alloy tubing to a second-floor storage room.

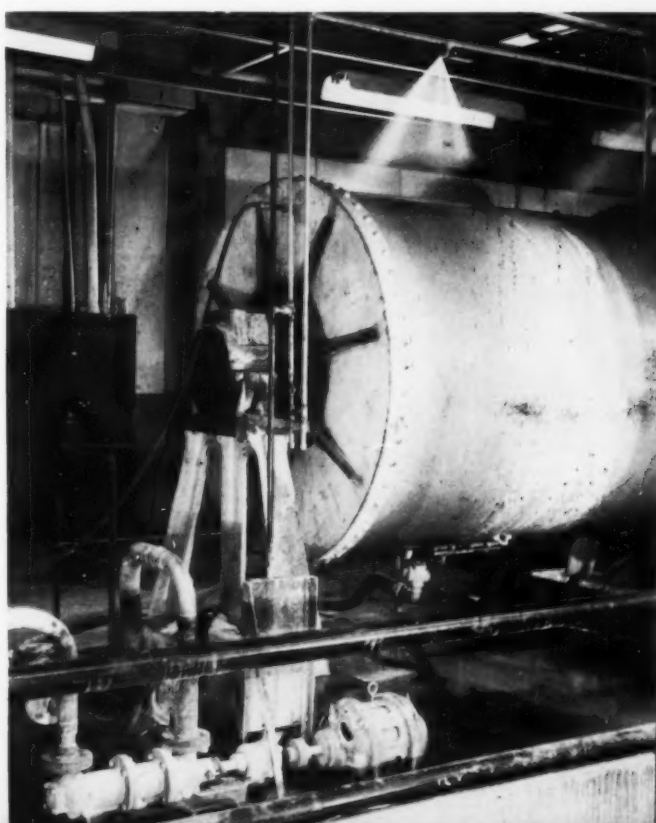
#### **Quick hose attachments**

Quick hose attachments are used throughout the complete mill and storage room. The quick connections save maintenance, loss of materials, and operator's time. It has been our

experience that rubber diaphragm valves are one of the important factors in the operation of the system because they prevent water leakage and keep air out of the system.

Welded joints are used throughout and everything is done to prevent the intake of air or leakage of moisture.

As a result of the points just men-







*Left: General arrangement of milled enamel storage in air conditioned room on the roof of the plant.*

*Left below: Operator is filling storage tank from mill being unloaded on lower level. Operator's hand is on valve in line from mill to storage tank.*

*Below: Transferring finish coat enamel from storage tank to pressure tank. Showing portable centrifugal sieve magnetic separator equipment.*

tioned it has been possible to leave enamel in the lines for months without clogging the system.

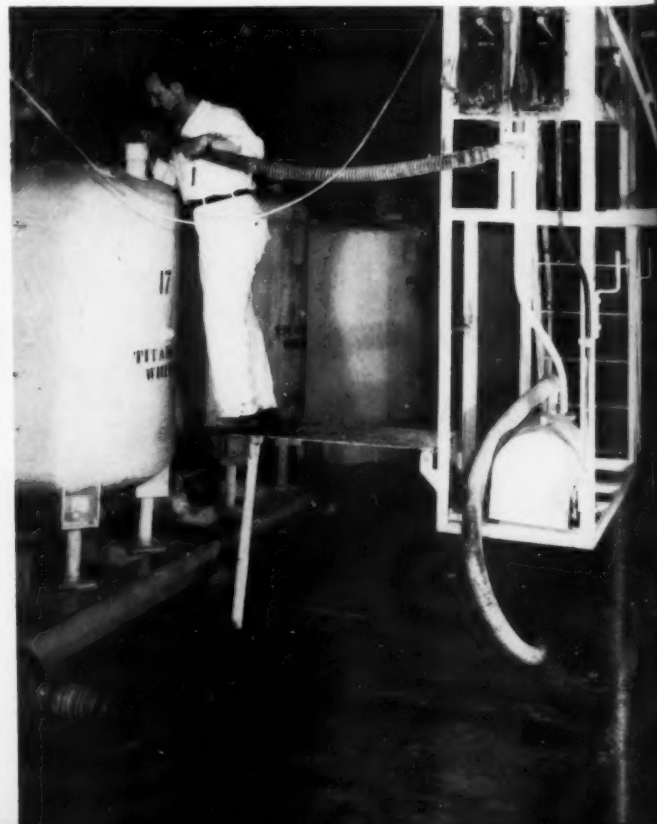
#### **Air-conditioned storage room**

In an especially constructed air conditioned room located one story above the mill room and adjacent to the frit and raw materials storage

room there are a total of twenty—500 gallon storage tanks, nineteen—250 gallon pressure tanks, and seven—60 gallon pressure tanks. The 500 gallon storage tanks are porcelain brick lined. They alternate in the line with the 250 gallon pressure tanks which are all stainless-clad. Some standard 60 gallon pressure

tanks are used where material usage is minor.

Centrifugal sieve, magnetic separator, and pump for transferring enamel from storage to pressure tanks are mounted together on a portable frame suspended from a monorail system paralleling the line of storage tanks. Pump capacity is 8 to 10 gal-

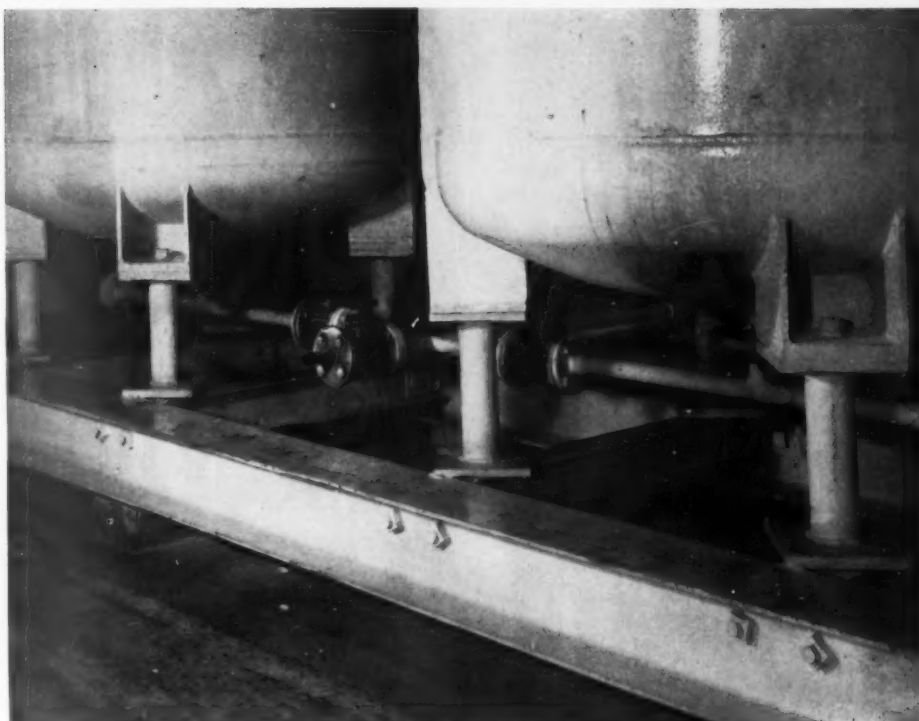




*Below: Units suspended from overhead parallel rails are used for transferring and conditioning of enamel between storage and pressure tanks.*

*Right: Showing tubing connections for dual pressure tank set-up to allow alternate use of adjacent tanks for uninterrupted flow of enamel.*

*Right below: Automatic timer is used on all storage tank agitators to operate agitator approximately ten minutes out of each hour.*



lons per minute which balances with the other equipment. Four such complete units are used, two for ground coat and two for cover coat.

#### **Enamel piped to point of use**

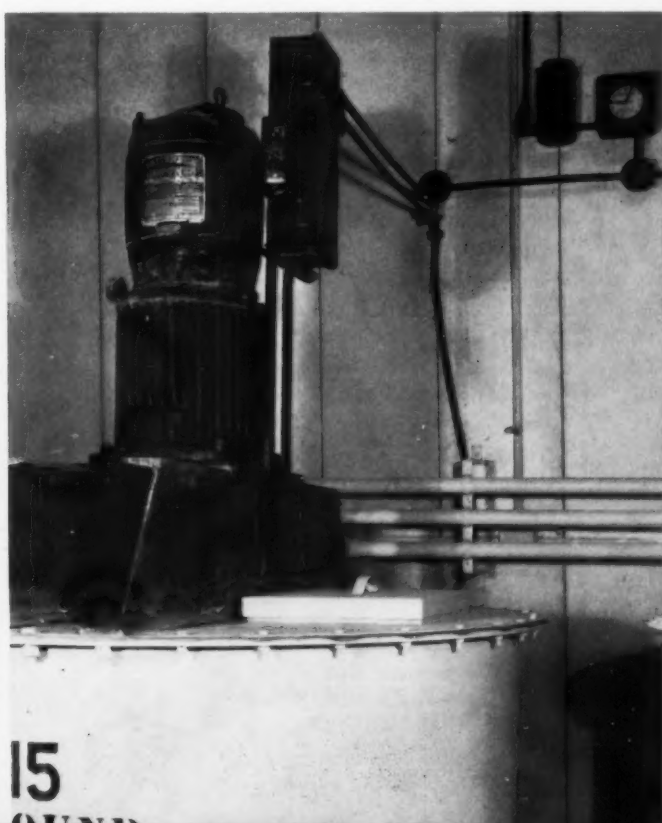
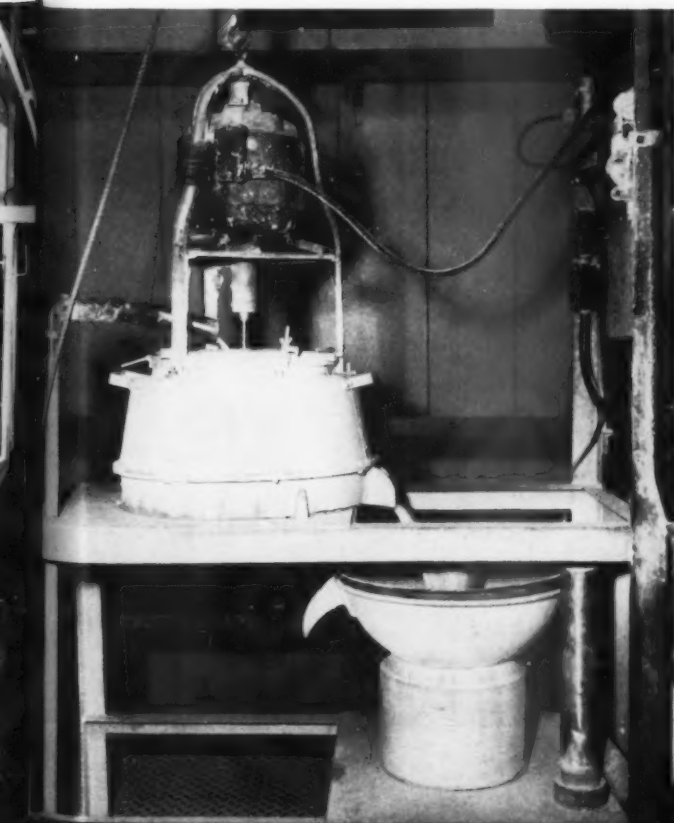
On leaving the pressure tanks (in the storage room) the liquid enamel is conducted to point of use through

1 $\frac{1}{4}$ " alloy tubing. This tubing must travel over heated areas such as furnaces, etc. and is therefore heavily insulated with wrapped insulation. For cooling, two  $\frac{1}{4}$  inch copper tubes parallel the enamel supply tube inside the insulation and these  $\frac{1}{4}$  inch tubes carry a continuous flow of water. This water is discharged

through the millroom drain.

The main supply tubes lead to manifolds at points of use (both spray booths and dipping areas).

Manifolds in the spraying area consist of 3" straight sections of tubing with the feed line entering at the center. Fittings for hose connections are at the under section of





*Left: Shown are controls near one of spray booths by which spray foreman can adjust pressure by remote control on supply pressure tanks in enamel storage room 250' away.*

the tube. All valve connections are of rubber diaphragm type.

As many as ten sprayers operate from a single manifold but this is not indicated as a limit for the system.

Through a system of controls it is possible for a foreman to adjust pressure, by remote control, on the supply pressure tanks in the enamel storage room, from a convenient location at the point of use.

#### **What the system does**

Some observations in connection with the use and results from the system may be of interest.

In one instance a feed line and manifold system that had been in use for 18 months was dismantled for relocation and there was no indication whatsoever of clogging or corrosion.

There has been material saving of approximately 4,000 gallons of milled enamel per month resulting from the use of this system over conventional methods in use previously. This saving combines losses of raw materials

in handling, milled enamel spillage, washout losses in tanks, mills, storage tanks, etc.

Better control of enamel is possible as a result of centralized control. One operator per shift in mill storage room controls all slip characteristics for all enamels used in the plant.

Spraying has been improved as there is minimum fluctuation in fluid and air pressures, and the spraying characteristics of the enamels are more constant.

A far greater degree of cleanliness is possible in the enamel and it is also reflected in good housekeeping characteristics within the plant. The enamel never touches the air from the time it leaves the millroom pressure tank until it reaches the gun. This, of course, means minimum possibility for contamination.

It has been definitely proven that a system such as the one described is workable and efficient, but the point should be stressed that the complete system must be very carefully designed, constructed of carefully selected materials, and above all carefully checked for possible air leakage. No half measures will prove satisfactory in connection with an installation of this type. This means that the plant should have sufficient enamel usage of standard type enamels to justify the original cost of installation.



*Right: Photo shows an operator filling the ground coat dip tank from the piping system.*

# Another workable program

## for reducing shipping damage

how Norge reduced shipping damage to one-third in two years—a workable program of field reporting for correlation with Safe Transit pre-testing

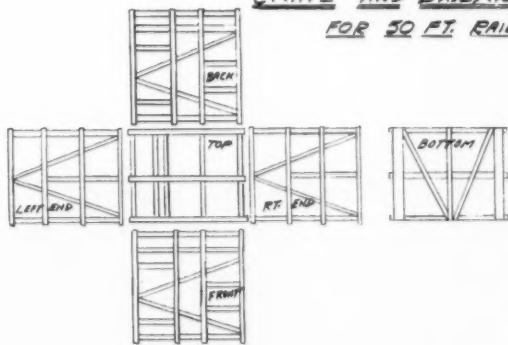
By R. E. Heine • CHIEF INSPECTOR, RANGE PLANT, NORGE DIVISION, BORG-WARNER CORPORATION, EFFINGHAM, ILLINOIS

A little over two years ago our plant was at a loss as how to pin down exactly what damage was occurring in transportation. We were aware of where our porcelain breakage was occurring, but due to conflicting reports from various sources, we were not able to evaluate the reports quantitatively. We were unable to determine conclusively whether certain complaints were minor or major and had difficulty in segregating facts from opinions, the latter probably sometimes being somewhat biased.

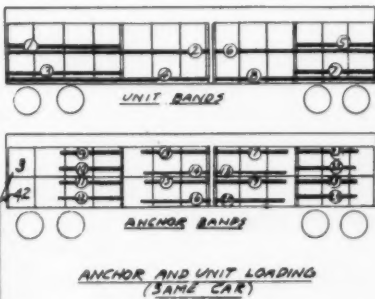
Our plant management then decided on a program whereby each of our distributors would be sent certain forms to fill out with each railroad car of ranges they received from us. The requested information would be put on the forms as the car was being unloaded, and, when completed, returned to the factory. With this information we felt we would have positive evidence to work with. The accompanying Crate and Exterior Damage Charts and the Porcelain Damage Diagrams were our answer.

Presently, the program works accordingly. With each railroad car of ranges we send to our distributors, we forward via mail one Crate and Exterior Damage Chart filled out with the distributor's name, destination, shipping date, car number, and quantity of the type of ranges shipped. Also included is a Porcelain Damage Diagram for the type of range sent in that shipment. The basic Crate and Exterior Damage Charts are for 38" ranges; however, we attach supplements to take care of 20" and 36"

### CRATE AND EXTERIOR DAMAGE CHART FOR 50 FT. RAILROAD CAR ONLY



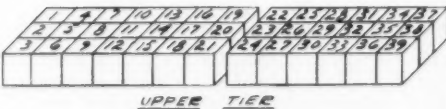
PLACE AN 'X' IN PROPER COLUMN		
BAND NO.	BROKEN	S. BAND
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
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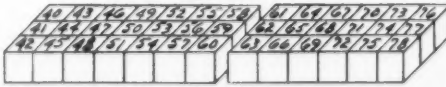
INDICATE DAMAGE TO CRATE BY PLACING CRATE NO. ON BROKEN SECTION OF PLAN OF CRATE

#### CRATE DAMAGE

INDICATE CRATE NUMBER AND TYPE OF DAMAGE BY AN 'X' IN PROPER COLUMN															
CRATE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															



UPPER TIER



LOWER TIER

#### CRATE LOCATION IN 50' CAR

NOTE: THE HIGHER NUMBERED CRATES IN EACH TIER ARE Banded TOGETHER IN THE SHORT END OF CAR

RANGE TYPE: \_\_\_\_\_

QUANTITY: \_\_\_\_\_

CAR NUMBER: \_\_\_\_\_

DISTRIBUTOR: \_\_\_\_\_

DESTINATION: \_\_\_\_\_

DATE SHIPPED: \_\_\_\_\_

DATE RECEIVED: \_\_\_\_\_ BY: \_\_\_\_\_

IF NO DAMAGE TO BANDS OR CRATES PLACE 'X' IN THIS SQUARE ☐

REMARKS: \_\_\_\_\_

DISTRIBUTORS: \_\_\_\_\_

PLEASE FILL OUT FORM AND MAIL TO: \_\_\_\_\_

MRS. J. B. ELMORE

PLANT MANAGER

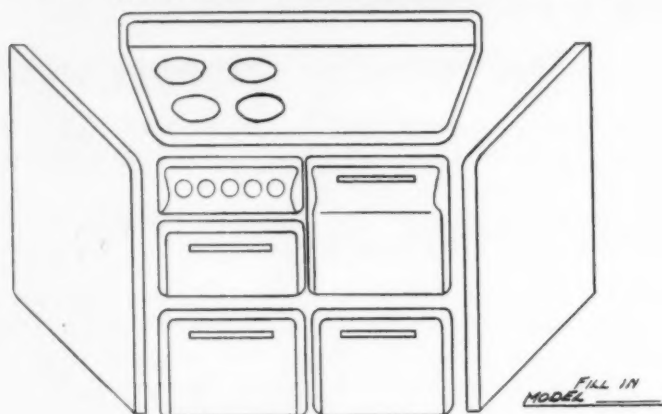
NORGE RANGE PLANT

EFFINGHAM, ILLINOIS.



## PORCELAIN DAMAGE DIAGRAM

INSTRUCTIONS: INDICATE PORCELAIN DAMAGES BY PLACING CRATE NUMBERS ON DIAGRAM BELOW ON THE EXACT LOCATIONS WHERE THE PORCELAIN DAMAGES OCCURRED



KEEP ATTACHED & RETURN WITH CRATE EXTERIOR DAMAGE CHART

ranges. The exploded view of the porcelain ware on the Porcelain Damage Diagram can be used for either gas or electric models.

When the railroad car is unloaded at our distributors, the warehouse man in charge of unloading completes the forms. He will indicate the exact external location of all porcelain damages (we use an open slat-type crate), the location of the damaged ranges in the car, the location of damage to any crate, condition of banding, and any remarks he might care to submit.

### Received charts analyzed on monthly basis

The received charts are analyzed on a monthly, as received, basis. To get a composite picture of the shipping damages, we transfer all information on master charts identical to the Crate and Exterior Damage Charts and range type Porcelain Damage Diagrams. At a glance we are able to tell which porcelain parts on which ranges are getting excessive damage, which locations in the railroad cars are more subject to range damage and crate damage, where our crate weakness might be, and just how our steel bandings on the units are holding up. Damage percentages are based on the quantity of the certain type of range reported on, to get a true comparative picture.

From the past information received from the analysis of the charts, we now have a re-designed crate that is stronger; we have added certain wipes on porcelain panels and eliminated others (the net effect was to improve appearance); we have instigated design changes in our rear uprights, end panels and other parts to make the range less conducive to

breakage; we have changed our range packing method; we have changed to the floating load method in the railroad car; and we have re-routed shipments to certain of our distributors. Some of these changes added to our unit cost, while others reduced it. Any minor cost additions were negligible, however, in comparison with the over-all savings to the company resulting from decreased transportation damages and improved distributor relations.

### In-transit damage reduced 1/3 in two years

We feel that our efforts have been rewarded. Our transportation damage has been reduced to almost 1/3 of what it was when the program was started over two years ago. We feel this is good in that claims paid by the railroads for stoves, ranges, etc., for this period of time have increased.

(As a matter of interest, there is a high degree of correlation between the results obtained from the testing procedures as approved by the National Safe Transit Committee and the actual conditions reported in our range Porcelain Damage Diagrams.)

## FOR 36" RANGES ONLY

1	4	7	10	13	16	19	22	25	28	31
2	5	8	11	14	17	20	23	26	29	32
3	6	9	12	15	18	21	24	27	30	33

UPPER TIER

34	37	40	43	46	49	52	55	58	61	64
35	38	41	44	47	50	53	56	59	62	65
36	39	42	45	48	51	54	57	60	63	66

LOWER TIER

CRATE LOCATION IN 40' CAR  
SEE UNDER SIDE FOR 38" RANGE CHART



# Spraying technique

## for porcelain enamels and synthetic finishes

a two-part article including a complete discussion of "low pressure" spraying for porcelain enamels and pointers on control of spraying technique for synthetic finishes

By *M. L. Pouilly* • THE DEVILBISS COMPANY, TOLEDO, OHIO

**L**OW pressure spraying has been practiced in the organic finishing field for some time and with very good success. The system now is proving its merit in the ceramic finishing field.

In order to cover the subject of low pressure spraying, it would be well to briefly discuss what is involved, what should be done, and what is the result. To do this, there are really five phases to be considered, namely:

1. Selecting proper equipment.
2. Porcelain enamel supervision.
3. Proper enamel slip control.
4. Sprayer technique.
5. Economies effected.

In choosing equipment for spraying porcelain enamel, care should be exercised in the selection of equipment so as to have that best suited for the specific job and the type of enamel used. There is such a wide range of articles to be coated and such a variety of materials used that no set rule covering all the equipment, particularly the spray gun, can be used. A spray gun has three variables, namely: the air cap out of which comes the air streams used for atomization, the fluid tip which meters the amount of material used, and the fluid needle which acts as a valve opening or closing the fluid tip passage. Experience over years has proven that one combination of these three spray gun essentials cannot be adopted for general usage.

In the past the trend of equipment manufacturers, frit companies and the users of spray equipment was to use as much air pressure as possible and the largest sized fluid tip available in order to get the maximum width of spray and what all thought

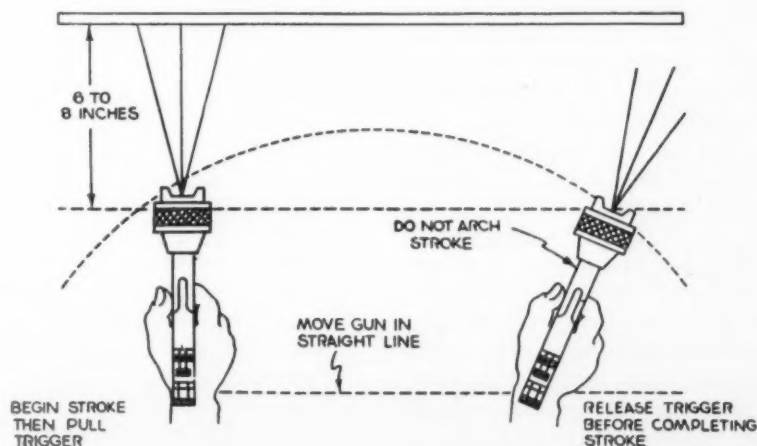
—the maximum in speed. The wider the fan or spread of the spray gun the better the operator liked it, regardless of the quality of the finish or the waste of material and air.

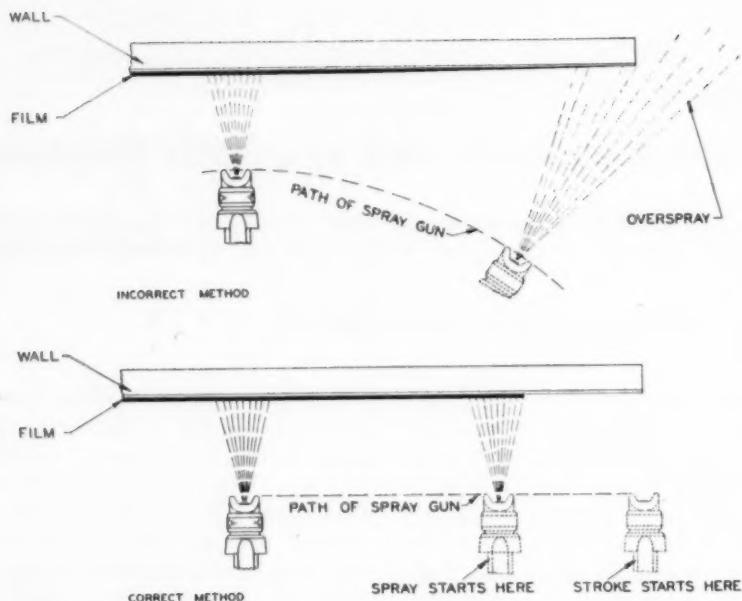
Today it is the contention that there is no need for a wide spray. While this is generally contended it is particularly true in the spraying of titanium enamels. With the more general use of materials of a finer grind and lower gram application, we are approaching the conventional in the size of fluid metering orifices used as well as the technique of application. The aim today is to get a narrower fan with a more concentrated effective spray pattern. With this it is possible to get a desired spray with a minimum of dust and overspray. Lower atomizing pressures are the direct result. An example of this lower pressure is in the application of 20 to 30 gram's coating where as low as 50 lbs. are being used successfully.

With the trend toward lighter application it is essential that a positive control be had over the atomiza-

tion pressure. To maintain this pressure, air regulating means are a must at each spray station unless as in some plants a central control is maintained which is adjusted by supervisory personnel. This latter control of course would only be satisfactory where all spray stations are operating most efficiently and effectively at the same pressure.

Fluid pressure control is also highly important. With smaller fluid metering orifices used in spray guns the fluid pressures are likely to be somewhat higher than that with larger ones. The proper fluid pressure for the material and operation must be determined and then maintained. Many times the operator attempts to control the fluid flow by the fluid adjustment means at rear of gun. Never permit the flow of enamel to be controlled by chocking the fluid needle action. With the correct orifice size in tip and the proper fluid pressure, one will have definite control and besides the operator has a spray gun with the minimum of exertion of trigger pull. Fluid pressure





can be raised to the point where the speed of the fluid stream is faster than the air streams in the air cap can handle it. Improper atomization results. Should this occur it is an indication that too small a metering tip is being used and that the size should be increased.

#### Porcelain enamel supervision

Supervision in the enamel industry is more and more important as controls of materials, equipment and techniques assume importance. The belief of many that "what was good 20 years ago is good enough today" must be erased. With the keener competition it behooves them to study their methods seriously and improve them where possible.

Every possible clue to lower costs and improve quality must be found. Costs can be lowered by saving material, reducing rejects, finding and adopting new methods and techniques of applying porcelain finishes.

The fine grind and lighter applied coatings are playing an important part. Supervisory control over the coatings and the conditions under which applied will also prove effective.

Man power must be carefully selected and definitely exposed to training. With so much at stake cost-wise in the finishing of products, education of personnel assumes an ever in-

creasing degree of importance.

#### Enamel slip control

When low pressure spraying is adopted, the results are dependent on control of conditions likely to influence the operator. To assure highest quality results it is necessary to control enamel slip. By this control is meant the establishment of a satisfactory set meeting the particular required conditions and then maintaining that set. Here we open a controversial subject.

The term "set" as being used in this paper is synonymous with viscosity. There are almost as many tests in use to determine "set" in the industry as there are individuals using them. Admittedly this is exaggeration, but the statement at least will draw attention to lack of standardization of testing methods. Since

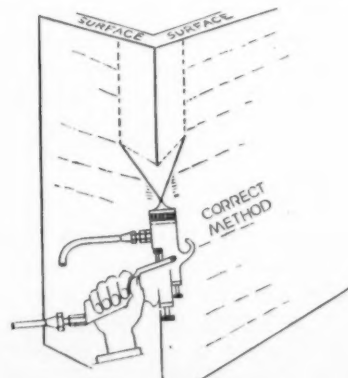
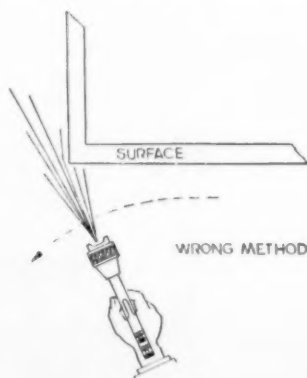
there is no test recognized as standard, definite data cannot be given on the recommended set for any particular type of ware.

There also is a difference of opinion as to whether a high specific gravity and low set or low specific gravity and high set is the best. Based on test experience in the field, it is our findings that a high specific gravity and a low set provides the combination for the best spray-ability of the material. One should bear in mind that all efforts thus far have been directed toward obtaining the highest quality sprayed finish. Also, it is recognized that variations may be necessary as influenced by the type of enamel used and kind of ware sprayed.

With a higher specific gravity, less water would be used and consequently less material need be sprayed for the desired coverage. Since the flow-out qualities of the slip are controlled by set, the lower the set the better the flow out qualities. Here, too, it is recognized that there are limitations on set which will vary with type of enamel, ware, thickness of coating and the position of the ware when sprayed.

As one may recognize from preceding comments, a definite recommendation for specific gravity and set cannot be made. It is important to have the best combination for each particular case and the correct combination does have a bearing on the spraying conditions and the resultant quality of finish. So the suggestion is passed along to work out the best formula for conditions in individual plants. This should not be a hurried

to Page 70 →



# Eighteenth annual meeting of the Porcelain Enamel Institute

**M**EMBERS of the Porcelain Enamel Institute met at the French Lick Springs Hotel, French Lick, Indiana, Thursday and Friday, October 27 and 28, to elect officers, executive



*President Meacham*

committee, and board of trustees; to hear annual reports of the working committees; to pass on plans for 1950; and for a "wee bit" of diversion.

## Meacham is new president

F. L. Meacham, vice president and general manager of Chicago Vitreous Enamel Product Company, was elected president of the Institute to succeed C. D. Clawson, president of Ferro Enamel Corporation.

W. A. Barrows, of Barrows Porcelain Enamel Company, was elected a vice president and other vice presidents re-elected were Herbert R. Spencer, of Erie Enameling Company; J. T. Penton, of California Metal Enameling Company; J. H. E. McMillan, of Ingram-Richardson Manufacturing Company, Beaver Falls, Pa.; R. A. Dadisman, of Armco Steel Corporation, Middletown, Ohio; and T. G. Harris, of Porcelain Steel Corporation, Connersville, Indiana.

## Co-educational meeting

This year's annual Institute meeting was brightened by the presence of a number of wives of the members in attendance. A separate program of activity was planned for the ladies by the program committee. Thursday's meeting for the men consisted of a meeting of the executive committee, a luncheon, and afternoon recreational activities—chief of which was a golf tournament. Winner of the president's cup for golf was T. G. (Ted) Harris, of Porcelain Steel Corporation, Connersville, Indiana, and a vice president of PEI. Both men and ladies attended the annual banquet which was followed by an entertainment program and dancing.

## A day of work

Friday's meeting consisted of a heavier schedule starting with breakfast meetings scheduled for the Architectural, Table Top and Steel Plumbing Fixture Divisions; morning sessions for the Sign Division and General Enameling Division. The morning session ended with a luncheon with C. D. Clawson, retiring president, presiding. President Clawson pointed to the possibility for broadened membership and increasingly effective constructive activity for the industry.

Mr. Clawson was presented with a beautiful silver tray and cocktail set for his outstanding service to the Institute and the industry during two terms as president.

## Twenty-five elected

### to board of trustees

During the afternoon session immediately following the president's address and reports by the officers, P. B. McBride, chairman of the Nominating Committee, reported a slate of twenty-five for the Board of Trustees—including four representatives each for the Architectural, Cooperating, Frit, General Enameling, Sign and

Table Top Divisions, and one for the Formed Metal Plumbing Ware Division. Unanimous election of the selections followed.

## Market development

The work of the Market Development Committee was discussed by D. H. Malcom, chairman. Suggested plans for the coming year would include the following: (1) a commercial publicity program which will provide publicity for all divisions along the same lines as carried out in 1949; (2) development engineering which would include a more intensive study of new uses and applications for porcelain enamel as the basis for supplying a larger volume of new business; (3) general promotion for special publicity requirements

## New PEI Officers

President: F. L. Meacham, Chicago Vitreous Enamel Product Co.  
Treasurer: P. B. McBride, Porcelain Metals Corporation of Louisville  
Secretary: Edward Mackasek, Porcelain Enamel Institute  
Vice Presidents:  
H. R. Spencer, The Erie Enameling Company  
J. H. E. McMillan, Ingram-Richardson Mfg. Co. (Beaver Falls)  
J. T. Penton, California Metal Enameling Co.  
R. A. Dadisman, Armco Steel Corporation  
T. G. Harris, Porcelain Steel Corporation  
W. A. Barrows, Barrows Porcelain Enamel Co.

and for particular activities which cannot be anticipated in advance; and (4) providing market development counsel for the divisions and for such individual companies as may request. The committee will offer its services in such cases to study and analyze





*Left: H. R. Spencer, Erie Enameling; J. H. E. McMillan, Ing-Rich; Mrs. Dadisman and Ray Dadisman, Armco Steel Corp.*

*Left below: Mrs. Malcom and Don Malcom, Armco Steel Corp.*

*Below: Mrs. McBride and P. B. McBride, Porcelain Metals.*

the problems, to develop suitable plans, and to supervise the expenditure of such funds as the individual division may raise for promotional purposes.

#### **Product standards**

A report of the Product Standards Committee, headed by G. H. Spencer-Strong as chairman, offered a comprehensive outline of the work done in relation to test methods, test procedures, and equipment. Other responsibilities of the Committee include the administration of a research fellowship at the National Bureau of Standards and the publishing and re-issuance of technical bulletins covering test methods.

#### **Commercial research**

F. C. Woleslagle, chairman of the Commercial Research Committee, reported on the activity of his group in connection with market surveys, investigations of potential new markets and other similar activities which are closely aligned with the work of the market development group.

#### **Safe Transit committee**

The importance of the National Safe Transit Program for the reduction of packing and shipping losses is growing with each succeeding month. Under the chairmanship of R. F. Bisbee, the Committee's work is coordinated in the offices of the Porcelain Enamel Institute in Washington, D. C. In commenting on this program, Edward Mackasek, PEI managing director, said "No activity previously undertaken by the Institute has given it such prestige and position outside of our own group as has the Safe Transit program".

#### **finishfotos**



*Right: Mrs. Barrows and W. A. Barrows, Barrows Porcelain; Vern Messner, Cleveland Porcelain, and Mrs. Messner.*

*Below: Emmet Dwyer, Wolverine Porcelain; Mrs. Holcomb and Jim Holcomb, Wolverine; and Roger Allen, architect.*

*Bottom: E. A. Headland, Enamel Products; Bill Wenning, Ceramic Color; H. H. Weinburgh, Texlite.*





Right: Retiring president of the Institute, C. D. Clawson; Bennett Chapple, Armco Steel; Ted Harris, Porcelain Steel; and Edward Mackasek, secretary and managing director of PEI.



finishfotos

Right: C. D. Clawson, president of Ferro Enamel Corp., is shown with silver tray and cocktail set he received for his service to the Institute during two terms as president.



Left: Mrs. Chapple and Bennett Chapple, "the old ironmaster."



Below: Hugh Mc E. Patton, Ing-Rich (Beaver Falls); Mrs. Coin and Ray Coin, Ing-Rich (Frankfort).



#### Institute development

The Institute Development Committee, headed by J. M. Tuthill and Dana Chase, co-chairman, suggested the continuation of the strong educational campaign to all companies operating porcelain enameling facilities to stress the importance of Institute activity and the specific advantages of this activity to plant operators. An "every member drive" was suggested as part of the activity for the coming year.

#### Sales management conference

The report of C. P. Lohman, chairman of the Sales Management Committee, stressed the growing importance of this function in aiding the industry to grasp a better concept of the potentials and the need for better marketing practice.

It was generally agreed that the quality and importance of the programs for the annual Sales Management Conference had been improved with each succeeding year. Properly handled, this should be one of the motivating forces behind merchandising plans for finished metal products.

#### Process development

E. L. Seasholtz, chairman of the Process Development Committee, described the practical shop bulletins which have been developed by the group and indicated a plan for a continuance and expansion of this activity which is designed to assist the practical shop operator.

#### Shop practices forum

The annual Porcelain Enamel Institute Forum for plant men this year

to Page 66 →



## **A new trend in department store architecture**

**attention value, beauty, design and color all form a part of the overall effectiveness of this new architectural porcelain installation**

**P**HOTOS on these two pages show the new Federal Department Store of Grandfield Development Company, at Grand River and Greenfield Avenues, in Detroit. Architects for the

job were Chas. N. Agree, Inc., and contractors were O. W. Burke Co. The architectural porcelain enamel panels were furnished by Wolverine Porcelain Enameling Co.

Taking everything into consideration — prominence, beauty, size, design, color, etc. — the new Federal Department Store project is the kind of an installation that is beneficial to

*The progress photos of this outstanding architectural porcelain installation in Detroit were furnished through the courtesy of Wolverine Porcelain Enameling Co., suppliers of the Glasiron architectural porcelain enamel.*

the entire porcelain enameling industry.

#### Materials and usage

Entire base course—half-inch stainless steel, by Maul Macotta Corporation.

All building facade and walls of storm vestibules in entrances—colorful half-inch porcelain enamel (Macotta). Every four units on the building are encompassed with a 1¼-inch band of stainless steel.

All piers or pilasters—brown Granux.

All awning hoods (both fixed & hinged), canopy facias and soffits, entrance ceilings, storm vestibule ceilings, sign backgrounds—architectural porcelain enamel. The prominent sign backgrounds project from the main face of the building and are finished with soft radius corners. Detail was achieved by attaching work to light steel framing, as progress photos illustrate.

All sign work, including the striking porcelain enamel identification letters and neon, by Service Sign Co.

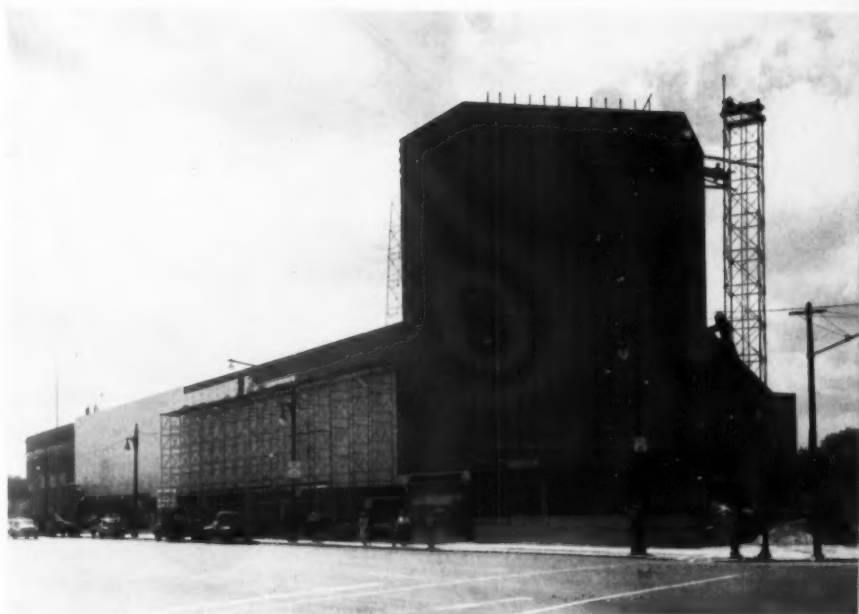
#### Color scheme

All light material throughout is a beautiful two-tone mottled pearl.

Sign backgrounds and recessed contrasting colored stripes in tower are a rich blue-green. Sign letters on towers, solid cream; on building, two-tone effect with light green faces and blue-green sides.

The total amount of porcelain enamel used in the project was approximately 40,000 square feet.

finish DECEMBER • 1949



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# Pickling sheet steel

## prior to finish application

By T. F. O'Brien • MAC DERMID, INCORPORATED, WATERBURY, CONNECTICUT

THE basic problem in all metal finishing preparations is to get the metal clean, to free the surface of dirt. The best definition I know of dirt is "matter out of place." To the layman, dirt is self-evident and requires no further explanation. To the metal finisher, dirt is a complex of chemical and physical components, with widely varying reactions under different circumstances. The mere enumeration of some of the common forms of dirt — oil, grease, paint, drawing compounds, smut, rust, scale, tarnish, corrosion — will give some idea of the problem. Many of these forms of dirt, either singly or in combination, may be present on ware that must be cleaned for finishing. As such, cleaning, whether one realizes it or not, is a very complex phenomenon involving, in combination, such actions as wetting, surface and interfacial tension, emulsification, saponification, deflocculation, colloidal activity, solvent power, pH values, buffer action, total alkalinity and acidity, and water conditioning. In fact, the problem is so complex that each factor, or groups of them, could well be the subject of a whole paper. We emphasize these points of complexity of the dirt and complexity of removal lest some one may labor under the idea that all cleaners or dirt removers are alike. Couple this idea with the superstition that, since a cleaner tank and pickle room are used over and over, the solutions should last forever, and you have a source of real trouble (and a service man's headache). Operating in this fashion, you may too often succeed in your original plan of taking some dirt off, only to re-deposit on the ware something equally undesirable. In other words, you may be dragging on oily, greasy film, or a film of poorly soluble resin-ate material from your cleaner tank

into your pickle tank. And from there, heaven knows what goes through the nickel, the neutralizer, and into the finishing operation.

Getting back to the matter of dirt, and its comprehensive constituents,



T. F. O'Brien

we find some logic in the division of dirt into *organic compounds* (oil, grease, lubricants, smut) that must be removed by solvent or alkaline cleaning or a combination of the two, and *inorganic compounds* (rust, scale, tarnish and corrosion) that are removed by acid pickling.

I would like to beg your indulgence by quoting a few paragraphs of wisdom on the very important subject of cleaning by a man admittedly an expert in the cleaning field, the late L. E. Punderson.

*"The pickle room has been avoided to too great an extent in the past. If you were washing dishes in a pan and used the same dishwater for a couple of weeks for this purpose, merely adding a little more water to keep the level up to the proper point, and also adding soap, at the end of a week those using the dishes would*

*most certainly have ptomaine poisoning. Why can't we have ptomaine poisoning as far as porcelain enamel finishing is concerned?*

*"If you were going out and start from scratch to hire someone to operate a pickling room, it would seem entirely logical to hire a woman who has a thorough knowledge of how to properly wash clothes. There is no vast difference between washing clothes and washing steel. To properly wash clothes, the woman would use plenty of agitation, plenty of hot water and plenty of soap, and then she would most certainly pay definite attention to rinsing. In many pickle rooms, about all that can be said is that the metal receives a 'dunking'." (Note quoted from May, 1949 finish, Page 68.)*

Suffice it to say that Gene Punderson's analogy of the housewife and the pickle room operation is brief, concise, and to the point. I dare add that few housewives would accede to the poor housekeeping evidenced in so many pickle rooms. For reasons not too obvious nor logical, the pickle room, and the operations performed there, take on the atmosphere of an unwanted stepchild, and consequently a good place to keep your housewife out of.

### Three types of pickling acids

Prescinding from the "cleaning" aspects, the pickling of enameling iron, cold rolled steel, and the recently developed alloyed irons for scale and rust removal is usually performed in aqueous solutions of sulphuric or muriatic acid. Muriatic acid is not too commonly used; when used hot, it generates noxious fumes and acid mist that contaminate the atmosphere and corrode auxiliary equipment; when used cold, it pickles at too slow a rate and does not always

etch the surface to the satisfaction of many finishers.

More commonly used is hot sulphuric acid in concentrations usually from 5 to 10%. This as a faster and more efficient pickle than cold muriatic, but it suffers from several undesirable properties. It generates fumes and acid mist, causes corrosion and high maintenance, and may contaminate the atmosphere to cause scumming either in burning or on finished ware. In addition, both acids create handling and storage problems, present occupational hazards, and do not make for pleasant working conditions.

There are a series of proprietary compounds that have been used for some few years in a great variety of pickling and metal finishing operations. Within the past 18 months they have received some acceptance as a pickling medium prior to porcelain enameling.

There are two types of these acid-salt compounds now in use. One is a general type applicable to pickling regular enameling iron; this will produce a moderate etch satisfactory for enameling, without over-pickling or engendering hydrogen absorption. The other is an accelerated compound, originally designed for deep etching purposes in hot dip galvanizing and tinning operations. It has successfully been applied in pickling cold rolled steel, which by reason of the finer grain structure is more resistant to etching than annealed enameling iron.

#### The mechanics of pickling

At this point it might be well to review some of the fundamental concepts on the chemistry and mechanics of pickling. In general, the oxides to be removed from steel (or cast iron) may be simple oxides of iron, combinations of these oxides and/or hydrates of the oxides. Ordinary rust, which is essentially ferric oxide frequently partly hydrated ( $\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ ), may be removed in mineral acids rather readily unless the rust is particularly heavy. However, if the rust is contaminated with oil or some inert material, direct attack on the acid may be retarded or inhibited,

and slow or spotty rust removal results with a badly etched, or pitted surface, and at the expense of much acid, labor, and rework.

The removal of mill scale — or black oxide of iron usually formed by hot working, heat treating, or welding — is much more difficult than rust removal. Mill scale is normally a spinel type compound containing strata of iron oxides in both ferrous and the ferric state, or a combination of both. A typical mill scale will have an outer layer of hydrated ferric oxide (similar to rust), a bulkier stratum of ferrous-ferric oxide ( $\text{Fe}_3\text{O}_4$  — magnetite), and a layer of ferrous oxide ( $\text{FeO}$ ) adjacent to the basis metal. The under and outer layers are somewhat soluble in mineral acids, and the basis metal (or iron) is quite soluble. These layers are slightly more soluble in muriatic than in sulfuric acid solutions.

Unfortunately, the middle stratum, and the bulkiest layer, is practically inert in every acid and can be boiled in stronger solution than 15% without dissolving. (Hence stepping up temperature will accomplish nothing but hydrogen embrittlement.) Obviously, then, the removal of mill scale from steel in acid solutions must be, and is, for other reasons. When steel coated with hammer scale or mill scale is immersed in an acid solution, the thin layer of ferric oxide is readily dissolved, exposing a layer of ferrous-ferric oxide. This is insoluble but somewhat porous, and allows acid to penetrate through the pores. The acid then proceeds to dissolve the thin layer of ferrous oxide, resulting in partial undermining of the scale. If the acid had high enough wetting power, or low surface tension, it would keep attacking the ferrous oxide laterally and soon all the inert  $\text{Fe}_3\text{O}_4$  would be lifted off.

While the above mentioned attack on the ferrous oxide is proceeding, still another action is going on — the solution attack on the bare iron or steel, accompanied by the evolution of hydrogen. This results in further undermining of the scale and the hydrogen evolved prys off the scale by exploding. In most acid solutions this reaction is the chief reason for scale

removal, and the hydrogen evolution accounts for the degree of acid fuming, pitting, and high acid consumption.

The complex reactions explained take place in the enameling field only when the ware has been annealed (as after deep drawing or welding); the solution reaction takes place on rusted ware and on clean enameling stock. It is apparent then that a reduction in attack on the steel and a greater attack on the ferrous oxide should create an ideal condition for pickling. This ideal is approached, we believe, by proper compounding of the acid based salts together with other ingredients calculated to buffer the solution, give it greater wetting powers, and eliminate the fuming problem. This statement is predicated on a goodly number of representative installations.

From installations to date, both in and out of the enameling field, the following observations may be made:

(a) Ware containing oil and inorganic dirt or both normally prevents uniform action of conventional acids on rust or scale; acid cannot act on the rust or metal until it comes in contact with it. The acid based salts are compounded so as to provide lower surface tension; thus they may actually displace dirt because of greater attraction for the steel than the dirt.

(b) These low surface tension acid solutions tend to give a more uniformly pickled surface with a minimum of pitting, dull areas, unpickled areas, carbon smut and hydrogen embrittlement.

(c) It is compatible with nickel dips; in fact, it passes the real acid test for it may be used for pickling or acidulating purposes prior to bright nickel electroplating, a very rigid and severe test.

Regarding the economics involved in substituting acid salt compounds for the more conventional acids, this much may be said in general: an acid salt solution, from the standpoint of initial charge, will cost more, tank for tank, than sulfuric acid. But the true criterion of economy should be the total cost per square foot of surface area pickled. Despite the ini-

to Page 64 →

# Adherence of glass to metal

By Joseph A. Pask • ASSOCIATE PROFESSOR OF CERAMIC ENGINEERING, UNIVERSITY OF CALIFORNIA, BERKELEY, CALIFORNIA

WHY two such dissimilar materials as glass, a vitreous non-crystalline non-metallic, and metal should adhere is a most fascinating phenomena and, indeed, a very important one. The porcelain enamel and the electronic industries as well as many minor applications are dependent upon this phenomena. Explanation of the reasons for this adherence is highly intriguing from a scientific viewpoint. In addition, however, a knowledge of the theories would be of great practical value since a more intelligent and consequently better job of control and of improvement of products would then be more probable. Straight empirical testing and control would be minimized.

Let us, first, briefly examine the leading theories presented in the literature of porcelain enameling; secondly, examine the techniques of and theories held to by glass-to-metal seal technologists; and, third, conclude with a suggested theory of adherence of glass to metal.

Since the space available to cover this extensive subject is limited, we shall consider only the theories that seem to have received the greatest support in the literature. There are three such theories: a thin layer of metal between the glass and metal base (usually considered to be a plating out of the Co) which acts as a bond layer; an oxide layer between the glass and base that acts as a bond, or a solution bond; and a mechanical bond exemplified by the glass gripping to a rough metal surface. The latter two are the most commonly defended. Consequently, an attempt will be made to present some of the main evidence in support of these respective theories.

## Oxide layer theory

The theory has been strengthened by some of the following evidence.

The existence of an oxide layer ranging from .005 to .01 mils thick has been definitely proven. Iron oxide has been shown to be soluble in both — up to 0.5% in iron, and about 20-25% in glass. No adherence is experienced without the presence of an oxide layer as evidenced by firing in vacuum or in a reducing atmosphere.

The knowledge that only a certain amount of oxide produces desirable adherence is a disturbing factor in this theory. If oxide truly performs the function only of a bond, then it seems logical that any amount of oxide should produce equally good adherence.

The proponents of this theory state that the function of CoO is twofold: as an oxygen-carrier and as promoting and controlling the solution of iron oxide, thus acting as a "governor." The function of the nickel-plating is to act as an inhibitor toward the formation of too heavy an initial iron oxide scale which would be difficultly soluble in the glass.

## Mechanical bonding theory

Supporters of this theory point out that in all cases of excellent adherence the interface between the enamel and the base is highly irregular or roughened, or that there are dendrites present. Along the same vein, it has also been shown that adherence improves with an increase of dendrites or with an increasingly roughened surface. Furthermore, although the oxide layer does appear on a heavily oxidized piece it is doubtful that there is one in a piece showing excellent adherence — if there, it is extremely small or not continuous.

The function of the CoO in this theory is primarily to promote the solution of the oxide and to cause the precipitation of dendrites. Adherence experiments with glass without CoO have shown no dendrites at the

interface, a smooth surface, and an oxide layer that had experienced little solution.

The function of the nickel-plating is said to retard the oxidation of the iron and to assist the Co. Samples with nickel flash produced a more roughened surface in a shorter time with a corresponding improvement in adherence. It must be remembered, however, that the Ni must be very thin since larger amounts result in a layer with pure nickel properties which is known to have poor adherence.

## Theories of adherence in glass-to-metal sealing

The requirements in this field are perhaps more exacting because large sections of glass are employed instead of thin layers, and because the resulting article must be vacuum-tight. Therefore, a more critical effort is made to match thermal expansions, a maximum difference of  $10 \times 10^{-7}$  units/unit in thermal expansion coefficient being generally considered safe.

Materials are not the same. A number of metals, such as Co, W, Mo, Cu, and alloys such as Kovar, ni-iron, chrome-iron, dumet, etc., are commonly used. Glasses of a wide range of composition are available primarily to obtain the proper match in thermal expansion. The materials generally are a great deal more refractory than those used in porcelain enamels, the sealing temperatures being in the range of 1800 to 2300°F.

The metals are not subjected to pickling as in porcelain enamels. After degreasing, a metal is prepared for glassing by H<sub>2</sub>-baking at approximately sealing temperatures. Once the metal is baked, extreme precautions are taken to keep the sealing surface clean. Areas handled with the fingers usually develop bubbles and

to Page 68 →



# Sixth all-industry refrigeration and air conditioning exposition held in Atlantic City

THE nation's refrigeration and air conditioning industry will do approximately two billion dollars worth of business this year, K. B. Thorndike, president of the Refrigeration Equipment Manufacturers Association, revealed at the opening of the 6th All-Industry Refrigeration and Air Conditioning Exposition, held in Atlantic City, N. J., the week of November 13.

The Exposition, sponsored by REMA, was held concurrently with both the 4th annual convention of the Refrigeration and Air Conditioning Contractors Association and the 12th annual convention of the Refrigeration Service Engineers Society. Attendance was expected to pass the previous high of 12,000 before the end of the Exposition, stated REMA officials.

Other trade associations which held business meetings during the Exposition include: National Commercial Refrigerator Sales Association, Refrigeration Equipment Wholesalers Association, Refrigeration Industry Safety Advisory Committee, and American Society of Refrigeration Engineers. Other sessions were held by the National Electrical Manufacturers Association and the Air Conditioning and Refrigerating Machinery Association.

Mr. Thorndike, who is also vice president of Detroit Lubricator Co., told members of the Refrigeration Service Engineers Society, that the industry "has reached the stature of big business. It is a big industry. It is astonishing to see the giant strides that our industry has made.

"This year, sales of the refrigeration and air conditioning industry including household refrigerators will total between a billion and a half and two billion dollars.

"It is also safe to say that the commercial refrigeration and air conditioning industry will have sold well over a million pieces of unitary equip-

ment in 1949. That's a lot of business.

"The All-Industry Exposition has kept pace with the growth of the industry as demonstrated at this show. Our total number of exhibitors has



K. B. Thorndike, REMA president

grown from 168 at our last show to 212 exhibitors and over two acres of displays.

## Sales up 250 per cent over last pre-war year

"It is not too much to say that the sales for the year of 1949 represent an increase of from 200% to 250% more than the last annual pre-war year.

"This is an increase of which we can be justly proud and indicates the important place refrigeration and air conditioning are playing in the increased comfort and health of the nation and of mankind.

"New uses are being found every day for the application of refrigeration and more brand new designs are represented at this show than have ever been presented by this industry at any time before," stated Thorndike.

Mr. Thorndike announced that four educational conference and exhibits held in the past 12 months, sponsored

by their organization and RSES, constituted one of the greatest contributions of the industry. He said that four similar meetings would be held in 1950 in different parts of the country in order to reach the 10,000 RSES members.

## Consumer must be satisfied

"These educational exhibits provide a place for the service engineer to get first-hand information from the men who design the refrigeration equipment you live with. Our designs are influenced by your suggestions," the president of the manufacturers' group told the delegates. "The men who design meet on common ground with the men who install and service, and constructive ideas are exchanged. Such a cooperative effort must make for a better industry and give a better product to the ultimate consumer — the one we must both satisfy."

## Air conditioning

### beyond pioneering stage

The air conditioning business has passed the pioneering stage and the industry is several years along in the acceptance stage, C. S. Stackpole, vice president and general manager of Airtemp Division of Chrysler Corporation, stated before a meeting of the Refrigeration and Air Conditioning Contractors Association.

"From year to year after the war ended, we have seen each one produce, for the well-manned distributor, contractor, or dealer, greater volume and better profits."

Mr. Stackpole noted that the byword of the prospective purchaser of air conditioning equipment is not now so much "Why should I air condition?" but "When?"

## Customer awaiting

### return of salesmanship

Harry Bowser, manager of education department, Thomas A. Edison, Inc., told the contractors that there are indications now that the customer



is simply in a waiting line — waiting to spend his money when more prices get back to the levels that he knew before the skyrocketing began.

"But there is more than prices too that the customer is waiting for, although he may not know it," he added. "He is waiting for the return of salesmanship."

Declaring that a great challenge faces the American salesman today, Bowser said:

"He is the man of the hour . . . products are available, wants and needs are available, purchasing power is available, American industry needs sales. The American public needs sales . . . the salesman must sell."

The speaker emphasized that never in the history of our country has there been a greater shortage of real and potential salesmen.

"If we are going to have salesmen who can sell in this sales era that is ahead, we must train them to sell," emphasized Bowser. "Train them on how to meet people . . . and above all things how to ask for the order."

#### Must sell prosperity

Pointing out that this country stands on the threshold of its greatest selling era, the speaker said:

"Now we must sell peace. Now we must sell prosperity. Now as never before, we must sell to ourselves and the world our country's magnitude, its industry and wealth, its ingenuity, and its understanding of people's basic welfare. However, if we are to attain these inspiring objectives, we must first sell our country's goods and services."

#### Exhibits valued at \$5,000,000

Two hundred and twelve manufacturers displayed exhibits valued at more than \$5,000,000 in an area covering more than two acres of floor space, according to H. F. Spoehrer, of St. Louis, Mo., chairman of the Show Committee of the Refrigeration Equipment Manufacturers Association.

Mr. Spoehrer emphasized that with many American plants now over the "hump" of post war developments and with keener competition taking place in all major markets, a large

percentage of exhibitors for the first time displayed new models in all types of equipment.

Pointing out that this was the first time the All-Industry Exposition was ever held in the Eastern section of the country, George E. Mills, of Washington, D. C., Exposition director, stated that never before in the history of the industry were so many new and improved designs covering all types of commercial refrigeration and air conditioning equipment assembled under one roof.

#### International booth

An innovation of this year's show was the International Booth where a record was kept of all visitors from foreign countries, as well as a record of all export managers and export brokers. The booth was maintained

to aid representatives from abroad to find easily and quickly just what they were interested in.

#### Accumulation and productive investment of savings encouraged

Addressing a session of the National Electrical Manufacturers Association, Charles R. Cox, president of Carnegie-Illinois Steel Corporation, stated that the accumulation and productive investment of savings should be consistently encouraged as an important factor to meet the demands for a growing output of useful goods and services in our growing population.

This growth calls for continuous adjustment to meet the changing demands of an improved living standard, Cox said, adding that "The redistribution of the nation's man-

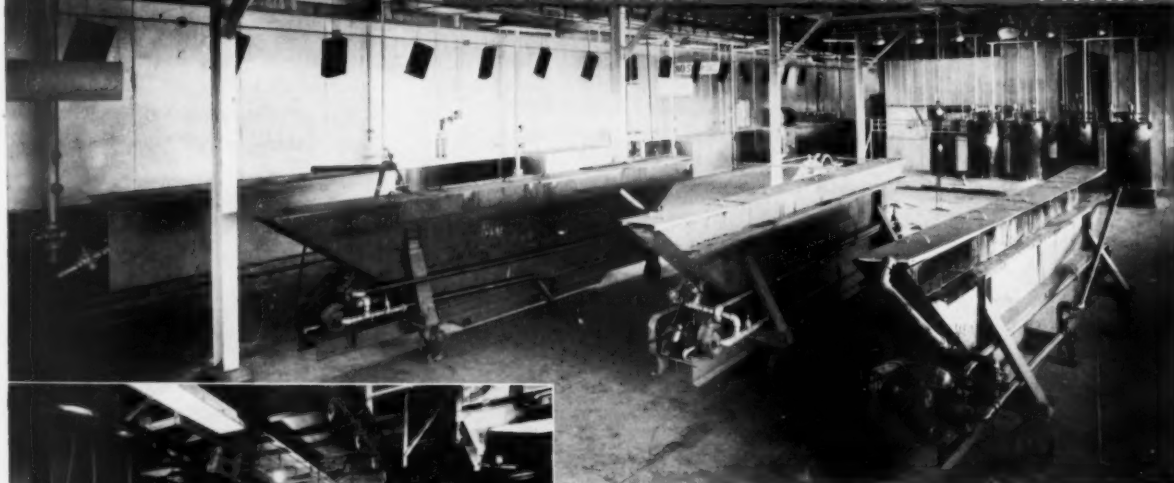
to Page 65 →

*An added attraction at the Exposition was "Miss Refrigeration."*



# COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT



## Portable Dip Tanks Permit Application of FOUR DIFFERENT COLORS on ONE PRODUCTION LINE!

Illustrated here are parts of a complete self-housed Mahon Finishing System recently installed for the Coleman Company, Wichita, Kan. It is the second complete Mahon system purchased by the Coleman Company in four years. This Complete Finishing System, which was built adjacent to manufacturing buildings, consists of a six stage Cleaning and Rust Proofing Machine, one Dry-off Oven, a Filtered Air Supply System, three Hydro-Filter Spray Booths—one of which is 70 ft. long, one Paint Baking Oven for sprayed parts, one Paint Baking Oven for dipped parts, and four Portable Dip Enameling Tanks which permit switching to any one of four colors without interrupting production. The whole system was planned, engineered, built and housed by Mahon—one responsibility for final results. Progressive manufacturers everywhere are well aware of the important part modern, efficient, cost-reducing production equipment plays in today's competitive markets. That is why so many successful concerns turn to Mahon for top efficiency in modern finishing equipment . . . they know that the Mahon organization has pioneered development in this highly specialized field for twenty-nine years . . . they know also, that world-wide experience, covering virtually every industry where finishing constitutes a major production operation, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available elsewhere. Write for Catalog No. 649, or see it in Sweet's Mech. Ind. File.

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HOME OFFICE and PLANT, Detroit 11, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens. Also, Core Ovens, Dust Collectors, and many other Units of Production Equipment.



Mahon Portable Dip Enameling Tanks which may be wheeled into the production line at any time a change in color is desired. Lower illustration shows a Portable Dip Tank in position in the production line. This arrangement permits switching to any one of four different colors in dip enameling operations on one conveyor line without interrupting production.



Mahon Hydro-Filter Spray Booths in two spray finishing production lines—part of the same Mahon Self-housed Finishing System.

# MAHON

# NEWS

W. A. Barlow, Portland Cement Company, announces the addition of Charles H. Scott to the organization. Mr. Scott (Scotty to industrial

## Link-Belt appointments

Link-Belt Company has announced the appointments of Eugene P. Berg, formerly general superintendent, to the newly created position of assistant general manager, and Richard Moyer, formerly superintendent of the steel shop, as general superintendent, manufacturing department, of the firm's Pershing Road plant in Chicago.

Other appointments include Stanley F. Zale as superintendent of the steel shop; Ray Witt, supervisor of time study and methods department; and Harold Hartman, chief inspector.

## New safety mark set by 53 steel foundries in national contest

Impressive gains in steel foundry safety practice, highlighted by achievement of an all-time record low in the industry's cumulative lost-time injury frequency rating, are emphasized in results of the 1949 national safety contest announced by Steel Founders' Society of America.

With 132 steel foundries participating on an industry-wide basis, 39 qualified for Highest Honor Awards with perfect safety records during the three-month competition, according to a report by F. Kermit Donaldson, executive vice president of the Society. Closely trailing the 39 top award winners were 14 other steel foundries which maintained near-perfect records with minimum lost-time accident ratings of 10.0 or less (per 1000 man-hours of exposure) for the period.

On a national basis, Donaldson reported, the cumulative lost-time fre-

quency rating of the industry was 19.1, compared to 28.4 in the same period of 1948.

## Dudley Jones heads Safe Transit laboratory coordinating division



The National Safe Transit Committee has announced the appointment of Dudley Jones, of Kaiser Metal Products, Inc. (formerly Kaiser Fleetwings), Bristol, Pa., as chairman of the Laboratory Coordinating Division of the National Safe Transit Program.

In his present position as materials and transportation superintendent at Kaiser, Jones' duties deal with all phases of warehousing, receiving, shipping, traffic, materials distribution, and all packaging problems.

Prior to joining the Kaiser organization a year ago, Jones was sales promotion manager for Woodbury Wholesale Hardware Co., in Portland, Oregon, and before that was materials

and transportation superintendent at the Kaiser Company at Swan Island.

## Winter homefurnishings market, January 9 through 20

The International Homefurnishings Winter Market will be held in Chicago, January 9 through 20, at the American Furniture Mart and The Merchandise Mart.

## Armour Research appointment

Harry H. Houston, II, former vice president of Brooks Manufacturing Co., Knoxville, Tenn., has joined the staff of Armour Research Foundation at the Illinois Institute of Technology, Chicago. He will work on research projects in the department of ceramics and minerals at the Foundation, according to Einar P. Flint, department chairman, who announced Houston's appointment as a chemical engineer.

## Washer sales in September reach year's high mark

Factory sales of standard-size household washers in September soared to the highest total since October, 1948, according to industry-wide figures announced by the American Home Laundry Manufacturers Association.

The September total was 357,281 units, compared to 323,789 in August, an increase of 10.3 per cent. It was 146 per cent greater than 145,194 units sold in the comparison month of 1941, the industry's best prewar year.

Ironers sold in September aggregated 27,700 units, compared to 32,300 units in August, a loss of 14.2 per cent, and down 25.7 per cent from 37,308 units in September, 1948.

## Alfred University celebrating 50th anniversary

A total of 339 students are enrolled in the New York State College of Ceramics at Alfred University for the first semester of the 1949-50 academic year.

The college, which is celebrating its 50th anniversary this year, is



offering a new course in "Engineering Indoctrination" to juniors in the department of ceramic engineering.

The course deals with the ethics, practices and objectives of the engi-

neering profession. It also will cover humanistic subjects that have a bearing on the professional and personal life of the engineer, and industrial safety and hygiene practices.

moved to larger quarters at 470 Frelinghuysen Ave., Newark, N.J. George N. Bick, president, reports that the new plant's 15,000 square feet houses many new facilities for research, testing, and production.

### **Stove men meet in Cincinnati, December 5-7**

Stove men will assemble at the Netherland Plaza Hotel, in Cincinnati, December 5, 6 and 7, for the 17th annual Convention and Exhibit of The Institute of Cooking and Heating Appliance Manufacturers.

Monday morning's program calls for a meeting of the Board of Trustees and a meeting of the Oil Division Technical Section. At noon there will be a luncheon meeting of the Kerosene Stove Division. The afternoon will be given over to meetings of the Electric Range Division, Export Committee, Oil Division Executive Committee, and Sleeve-Type Burner Division.

The general session is scheduled for Tuesday morning, with A. B. Ritzenthaler, Institute president, presiding. Following the president's annual report, the following addresses will be presented: "Hook, Lyin' and Sinkin'," by Warren Whitney, vice president, National Cast Iron Pipe Division, James B. Clow & Sons; "The Pension Dilemma," by Ben Mugridge, partner, Dodge & Mugridge, labor relations counsel; and "Selling is Human," by Fred A. Kaiser, ICHAM executive vice president, and vice president of Detroit-Michigan Stove Company.

The annual Management Forum will be held Tuesday afternoon with the following authorities in their fields contributing to the discussion:

Moderator, Cecil M. Dunn, vice president, Estate Heatrola Division, Noma Electric Corporation; Top Management Official, A. B. Ritzenthaler, vice president, The Tappan Stove Company; Financial Executive, Sidney R. Hill, controller, Cribben and Sexton Company; Sales Manager, H. L. Clary, director of sales, Norge Division of Borg-Warner Corporation; Factory Manager, Hugo E. Kenitz, vice president, Globe American Corporation; Labor Relations Official,

J. B. Tudhope, director of industrial relations, Florence Stove Company; and Credit Manager, B. R. Tritton, vice president, American Stove Company.

The president's reception and dinner will be held Tuesday evening in the Pavillon Caprice.

Meetings on Wednesday morning include: Gas and Combination Range Division, Gas Space Heater and Floor Furnace Division, Oil Division, and Solid Fuels Division. The afternoon will be given over to meetings of credit managers, financial executives and accountants, labor relations and factory management officials, and sales, advertising and marketing research officials.

### **Watkins named chief development engineer of Almco**

The appointment of N. L. Watkins as chief development engineer of the Almco Division of Queen Stove Works, Inc., Albert Lea, Minnesota, has been announced by R. C. Trow, manager of the division.

Almco manufactures deburring and finishing barrels as well as a complete line of separating and handling equipment. The division also distributes a wide range of barrel finishing abrasives and compounds.

Prior to his association with Almco, Watkins was with Westinghouse Electric Corporation for five years as manufacturing engineer in Pittsburgh, Pa. Before joining Westinghouse, he was associated with Remington Rand Corporation, Elmira, N. Y.

### **Fidelity Chemical moves to larger plant**

Fidelity Chemical Products Corp., manufacturers of industrial metal treating and cleaning compounds, has

### **Murray to Detrex board**

At a recent meeting of stockholders of Detrex Corporation, Detroit, Robert Lindley Murray was elected a director of the firm. Murray is also executive vice president and a director of Hooker-Electrochemical Co., Niagara Falls, N. Y.; vice president and director of Hooker-Detrex, Inc., a jointly owned subsidiary of the Hooker and Detrex companies; and a director of Power City Trust Company, Niagara Falls.

### **Binks offers one-week spray finishing course in February**

A special one-week course on porcelain enamel spray finishing, beginning February 6, has been announced by Binks Manufacturing Co., Chicago, manufacturers of spray finishing equipment. All those interested in ceramic finishing are invited to attend the course. The classes will be conducted without charge. It was announced that E. E. Bryant, of Ferro Enamel Corporation, will be on hand to answer questions on porcelain enamel and porcelain enameling shop procedures.

Registration applications should be addressed to E. F. Watts, Binks Manufacturing Co., 3122 Carroll Ave., Chicago 12, Illinois.

### **Lonergan Mfg. buys Noma's refrigeration division**

Lonergan Manufacturing Co., Albion, Michigan, recently purchased the Refrigeration Corporation of America, Perth Amboy, N. J., from Noma Electric Corporation, it has been announced by S. J. Lonergan, president and general manager.

Twelve executives of Refrigeration Corporation will join Lonergan's staff, headed by Edward R. Legg, who was president and general manager of the former company. Legg's



new duties will involve direction of the corporation's sales organization.

#### **Resistance welds help auto industry set new record**

More than 46,560,000,000 resistance welds were required in producing this year's record automobile output, according to The Resistance Welding Institute. Now prominent as an assembly process in the fabrication of virtually all volume-production metal products, resistance welding scored its initial success in the automotive industry by making the assembly line possible.

Bert Lewis, of Northwest Chemical Co., has been appointed chairman of the nominating committee for the annual election of the Detroit Branch of the American Electroplaters Society.

#### **AMA annual packaging exposition in Chicago, April 24-27**

The 19th National Packaging Exposition, annual market place for packaging, packing and shipping materials, machinery, services and design, will be held at the Navy Pier in Chicago, Illinois, April 24 through 27, according to an announcement by the American Management Association.

J. M. Cowan, chairman of the exhibitors' advisory committee, estimated attendance of the 1950 Exposition will exceed 14,000.

At the same time, Cowan made public results of an analysis of the attendance of the 1949 Exposition in Atlantic City. Representatives of more than 5000 firms in 400 industries explored the products and services offered by 200 exhibitors in the \$6 billion-a-year packaging, packing and shipping industry.

More than 40 per cent who attended, he pointed out, were either owners, officers or held top management positions in the companies they represented.

Thirty-three per cent of the attendance were packaging specialists or technicians upon whom top management depends heavily in making pur-

chases, and an additional 15 per cent were in the category of direct but more general influence such as sales executives and departments.

Mr. Cowan pointed to these facts and to the "steady, healthy growth of this Exposition as recognition

by industry of the economic value of a large and complete trade show." He said the show "provides a unique vehicle for the exchange of ideas and the quick assimilation of facts regarding new or improved techniques, machines and methods."

#### **SIPMHE elects new officers**



*R. C. Sell*

Results of a letter ballot election of officers to head the Society of Industrial Packaging and Materials Handling Engineers for 1950-51 were announced at a SIPMHE board meeting in Chicago, November 7, by R. J. Bayer, of Traffic Service Corp., and chairman of the Society's nominating committee.

R. C. Sell, general traffic manager of Koehring Co., Milwaukee, was elected as president and principal executive officer after serving two years as vice president.

Other newly elected SIPMHE officers include Paul O. Vogt, of General Electric Co., Schenectady, who was elevated to the newly created post of vice chairman of the board after serv-

ing two years as president. R. F. Weber, of International Harvester Co., Chicago, was reelected chairman of the board.

Stanley Price, of Western Electric Co., Chicago, is the new executive vice president. Two new regional vice presidents are: W. Gordon Bennett, of Anaconda Copper Mining Co., New York City (eastern); and Gale C. Cunningham, of North American Aviation, Inc., Los Angeles (western). J. H. Singer, of National Container Corp., Columbus, Ohio, was the only reelected vice president (mid-western).

J. L. Ware, of Sears, Roebuck and Co., Chicago, was retained as the Society's treasurer, and H. E. Brill, of Mid-States Container Corp., was named secretary.

#### **Hotpoint head says orders are running ahead of production**

Orders for appliances have been running ahead of production since early September, according to James J. Nance, president of Hotpoint, Inc., a leading manufacturer of major appliances.

Even if the steel strike had not curtailed production, it would have been necessary to work all (range plant) departments full time to the end of the year to meet increasing demands, he said.

#### **Central enamellers meet in Cleveland**

The first fall meeting of the Central District Enamellers Club was held at Hotel Allerton, Cleveland, Ohio, Friday evening, November 4, with 47 members present.

The business meeting, following a dinner in the Crystal Room, was called to order at 8 o'clock by Paul Cecil, Club president.

Two guest speakers for the evening were T. F. O'Brien, of MacDermid, Inc., Waterbury, Connecticut, and D. R. Goetchius, of Ferro Enamel Corporation, Cleveland, Ohio. Goetchius talked on "The Use of Urea in Porcelain Enamel," and O'Brien discussed "Pickling Sheet Steel Prior to Porcelain Enameling." Both ad-

dressess were followed by lengthy periods of discussion. The meeting adjourned at 10 p.m.

#### **Belgian distributor visits Whirlpool plant**

Plans for extensive promotion of Whirlpool home laundry equipment in Belgium and Luxembourg were re-

vealed recently by Armond Posner, Belgian distributor for the St. Joseph, Mich., firm.

Posner announced the new campaign while visiting Nineteen Hundred Corporation, manufacturers of the Whirlpool machines. He was there to determine the availability of machines for an all-out sales effort.

#### **Maytag produces 6,000,000th washer**



In the picture above, Fred Maytag, third generation head of the company which bears his name, is shown congratulating L. C. McAnly (right), manager of manufacturing, on setting a new washer industry record with the production of the 6,000,000th Maytag. N. E. Molleck, production superintendent, looks on.

Felicitations were the order of the day as the machine was placed on a display pedestal at the end of the assembly line. Management Club, union officials, labor-management committee members and others who shared in the achievement received jubilant congratulations.

#### **The need for business statesmanship**

"It has become commonplace to say that the United States has become a great world power and that responsibilities of leadership have been thrust upon us. What has not been clearly perceived is that leadership is not the responsibility of our Government alone. It is not the responsibility of a small group of business-

men who happen to be engaged in foreign trade or whose companies have overseas interests. More and more it is apparent that international economic matters are the proper and unavoidable concern of all businessmen, large and small, regardless of their business activity or geographical location . . .

"Business statesmanship today requires a much broader understanding of world economic forces. My concern is that we as American businessmen are not yet playing our part in this new world order . . .

"As businessmen we cannot abstain from assisting in the shaping of the international economic policies of our government. After all, vast sums of our money are being spent by government and we should certainly voice our informed opinions about how it is used . . .

" . . . the American businessman can make his influence felt at home and abroad and there are mediums through which he can be effective:

"By maintaining an informed interest in world economic affairs and exerting his influence on our government representatives who formulate economic policy.

"By helping to increase the interest and understanding of his associates in these vital matters.

"By working with like-minded men in foreign countries, to widen the understanding of the importance of economic freedom . . .

"If every business leader will invest some of his time in informed action on public policy, we can meet the post war challenge of business' contribution to peace."

The preceding quotations are excerpts from a speech given before the Sales Executives Club of New York, on November 15, by H. J. Heinz II, chairman of H. J. Heinz Company, and chairman of the United States Council of the International Chamber of Commerce, Inc.

#### **Industrial packaging, materials handling exposition scheduled for Philadelphia in 1950**

The national directorate of the Society of Industrial Packaging and Materials Handling Engineers has decided to hold its 5th annual Industrial Packaging and Materials Handling Exposition in Convention Hall, Philadelphia, in late September or early October, 1950, according to R. F. Weber, of International Harvester Co., SIPMHE board chairman.

The annual "short course" on pack-

aging and materials handling, held in conjunction with previous Expositions, will be continued in Philadelphia under the direction of H. C. Rountree, dean of Community College, Temple University.

An added feature of the Exposition will be the Society's annual "National Protective Packaging Competition."

#### **Owens-Corning names three new branch managers**

Owens-Corning Fiberglas Corporation, through Ben S. Wright, vice president, has announced the appointments of new branch managers to head the firm's sales offices in New York, Chicago, and Detroit.

Harold D. Bates was named New York branch manager. He formerly was with Philip Carey Mfg. Co., Cincinnati, as general merchandising manager, and prior to that was in sales, advertising and merchandising in New York for Johns-Manville Corp., and earlier was advertising manager of Weyerhaeuser Sales Co., St. Paul. He also served at one time as chairman of the advertising committee of the Asphalt Roofing Industry Bureau and as chairman of the publicity committee of the National Mineral Wool Association.

Russell R. Galloway, appointed to head the Chicago branch office, was formerly president of Smith Asbestos Co., Millington, N. J., and earlier was vice president of Certain-teed Products Corp.

John J. Hartnett, named manager of the Detroit office, was formerly general sales manager of Certain-teed Products, and prior to that was a district and division manager of United States Gypsum Co.

#### **First plant maintenance show to feature twenty-one experts**

A group of 21 experts will lead discussion of plant maintenance problems at a conference to be held concurrently with the 1st Plant Maintenance Show, at the Auditorium, Cleveland, Ohio, January 16-19, according to an announcement by Clapp and Poliak, Inc., the exposition management. L. C. Morrow, co-editor of *Factory Management and Maintenance*,

will act as chairman of the conference which is being sponsored by the American Society of Mechanical Engineers and the Society for the Advancement of Management.

Topics for the four-day conference include maintenance management principles; maintenance cost; light equipment; upkeep of motors, controls, distribution equipment, floors, walls and roofs; use of electrical instruments in maintenance; relationship of color and light to production; sanitation; lubrication; use of service equipment, and personnel safety.

#### **Acme Steel names board chairman**



Chester M. MacChesney, executive vice president, was elected chairman of the board of Acme Steel Company, Chicago, to fill a vacancy created by the death of Charles S. Traer, it was announced by Carl J. Sharp, president.

MacChesney first became associated with Acme in 1916 as a design engineer, and later held positions as head of the engineering department and superintendent of the Archer Avenue plant. In 1923 he was elected to the board of directors and in 1948 was named executive vice president. During his 33 years with Acme, MacChesney saw the company sales grow from \$2 million to \$60 million, it was stated.

#### **Tinnerman advances Dudley**

Eric Dudley, well known in the aircraft engineering field, has been named manager of aviation develop-

ment and manager of the Pacific Coast district of Tinnerman Products, Inc., it was announced by H. R. Russell, general sales manager. He will maintain headquarters in the Tinnerman office, 6030 Willshire Blvd., Los Angeles.

Dudley, who served as sales engineer in Tinnerman's Detroit office since 1946, was active from 1930 in the development of military aircraft. He was a member of the S.A.E. technical sub-committee on Aeronautical Material Specifications from 1940 to 1945 and also served on the War Production Board, Iron and Steel Branch Committee on the Establishment of National Emergency Steel.

#### **Gas practice course to be continued under AGA sponsorship**

The home study course on "American Gas Practice," formerly conducted by Columbia University, will be continued personally by Prof. Emeritus Jerome J. Morgan until such time as the new course on gas manufacture, now being prepared by the Institute of Gas Technology, is available for enrollments.

As formerly, the course will be sponsored by the American Gas Association which will issue certificates to students completing the course. During the time when the course is handled personally by Professor Morgan, students will receive the same material and instruction which those enrolled through Columbia University have been getting. The only difference will be that the course and the students enrolled in it will have no connection with the University.

#### **New switching center for handling orders at Carnegie-Illinois**

Orders for steel are now being handled by a new private telegraph switching center installed recently at Carnegie-Illinois Steel Corporation's offices at 208 South LaSalle Street, Chicago. The new system, said to be the largest and most modern in the world, is designed to flash telegrams between plants and offices of United States Steel subsidiaries throughout the country. The new push-button type center, replacing the old cord-and-plug type, is designed for speed



and ease in switching some 12,000 incoming messages received each day at the firm's Chicago station for destination points throughout the country.

#### **Watson resigns as vice president of Lincoln Brass**

E. H. Mueller, president and general manager of Lincoln Brass Works, Inc., has announced the resignation of Herbert A. Watson, vice president and assistant general manager. Mueller said that the resignation, effective January 1, was "accepted with regret" by the board of directors.

"Herb" Watson was made sales manager of Lincoln Brass in 1942, and in 1945 was advanced to vice president and assistant general manager. Previously, he was associated with the Gas Appliance Manufacturers Association.

#### **Ernest Richardson dies**



Ernest Richardson, retired president and co-founder of Ingram-Richardson Manufacturing Co., Beaver Falls, Pa., died November 11. He was also vice president of Ingram-

Richardson Manufacturing Co. of Indiana, Inc., at Frankfort, Indiana.

Born in Chesterfield, England, February 10, 1874, Richardson moved to Beaver Falls in 1882. While employed at Enameled Iron Company, he became a close friend of another employee, the late Louis Ingram. When the firm was sold in 1901, the two formed the Ingram-Richardson Manufacturing Company, leasing a plant from the former Midgely Wire Belt Co.

Ing-Rich is credited with being the first firm to enamel steel for refrigerator interiors and exteriors and pioneers in the production of enameled laundry tub covers and enameled stove parts.

The Ing-Rich plant in Frankfort, Indiana, was built in 1905 and 1906, and the plant at Bayonne, New Jersey, was built in 1924 and 1925.

## **Pacific Coast enamellers meet at ACS regional convention**

*By Malden Grange Bishop*

**M**ORE than sixty members of the Pacific Coast Enamellers Club ate turkey for lunch in the Moderne Room of the Ambassador Hotel, Los Angeles, October 20. The special occasion for the enamellers was their

participation in the Pacific Coast Regional Meeting of the American Ceramic Society. More than 400 members of the various branches of the ceramic industry met for a three-day session.

After eating turkey, the enamellers relaxed to listen to four experts in their field *talk* turkey. (Photo shows a majority of the enamellers attending the Enamel Division luncheon.) Joe Disario, Club president, served as





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### 1. LABORATORY CONTROL

Our ceramic engineers maintain constant contact with the production staff to make sure of highest quality.

### 2. PLANT TESTING

Right in our own job enameling plant, under conditions of actual use, we use PORCELFRIT. When you get it, it's right.

### 3. SERVICE ENGINEERING

Our Service Engineers are available to make sure that PORCELFRIT works right for your product. You take no chances.

### 4. IMPROVED SMELTING

Ing-Rich uses unquestionably the world's finest smelting method, the result of exhaustive research and experiment.

### 5. EXPERIENCE

Since 1901 Ing-Rich has pioneered in porcelain enameling. We have learned a lot in that time—and our customers profit by it.

INGRAM-RICHARDSON MFG. CO. OF INDIANA INC.  
OFFICES, LABORATORY AND PLANT  
FRANKFORT, INDIANA

chairman of the Enamel Division during the meeting, and presided at the luncheon.

Four papers, which provoked general discussion, were delivered. Glenn B. Fulton, Norris Stamping & Manufacturing Co., reported on the experiences of his company in "Enamel Production and Costs." M. L. Pouilly, The DeVilbiss Company, presented the case for "Low Pressure Spraying," which he has been demonstrating in western plants recently. "Pre-Pickling Operations," a paper by L. Pavlish, of Ferro Enamel Corporation, was read by Warren Felter. E. M. Hommel, the O. Hommel Company, discussed "The Effects of Mill Additions on the Properties of Titanium Opacified Cover Coat Enamels."

After their own session, the enamelers then joined the other Divisions for a banquet in the Embassy Room where Dr. A. Polyzoides, of the University of California, spoke on "America's World Position in the United Nations."

#### **YS&T promotes Holme**

Ernest Holme, assistant superintendent for the past six months, has

been promoted to superintendent of the Indiana Harbor rolling mills of The Youngstown Sheet and Tube Company.

#### **Beardsell joins Container Lab.**

Henry J. Howlett, president, Container Laboratories, Inc., has announced that Allyn C. Beardsell will join the Container staff effective December 1. Beardsell has been associated with Western Electric Company as headquarters supervisor of merchandise packaging and warehouse methods.

#### **George Tinnerman addresses American Society of Body Engineers**

"Elimination of Material Handling through Use of Self-Retaining Fasteners" was the subject of an address made by George A. Tinnerman, vice president of Tinnerman Products, Inc., before the American Society of Body Engineers at the group's annual convention in Detroit, November 3.

A study of the application of self-retaining fasteners in eight different operations showed that 22.939 cents was saved in material costs and 31.768 in labor and overhead costs, said

Tinnerman. He pointed out that approximately 60 per cent of the savings resulted directly from elimination of material handling.

#### **Gross joins Union Bag & Paper**

Theodore J. Gross, formerly managing director of the Shipping Container Institute, is now with Union Bag & Paper Corp., according to an announcement by J. L. Knipe, vice president, who stated that Gross will act as technical advisor to the corrugated box and board sales division in its sales promotion and product development program.

Gross resigned as president of Container Laboratories, Inc. in 1946 to be managing director of the Shipping Container Institute and head its 3-year study of the causes of rail freight loss and damage to merchandise shipped in fibre boxes. With the completion of that study, the Institute was formally dissolved this past summer.

#### **Honeywell branches add new valve line**

Products of the recently acquired Belfield Valve Division of Minneapolis-Honeywell Regulator Co. will be promoted and sold through 74 Honeywell branch offices in the United States, Canada, and Europe, according to L. M. Morley, vice president and general sales manager of Brown Instruments Division.

#### **New type burner helps gas utilities solve house heating problems**

Peak load demands again may vex some gas utilities this winter, and to meet this problem the Gas Service Company and the Midwest Research Institute of Kansas City (Missouri) have perfected a new type of burner that will automatically switch from gas to oil and back again whenever gas may be in short supply, or, inversely, should heating oil be scarce.

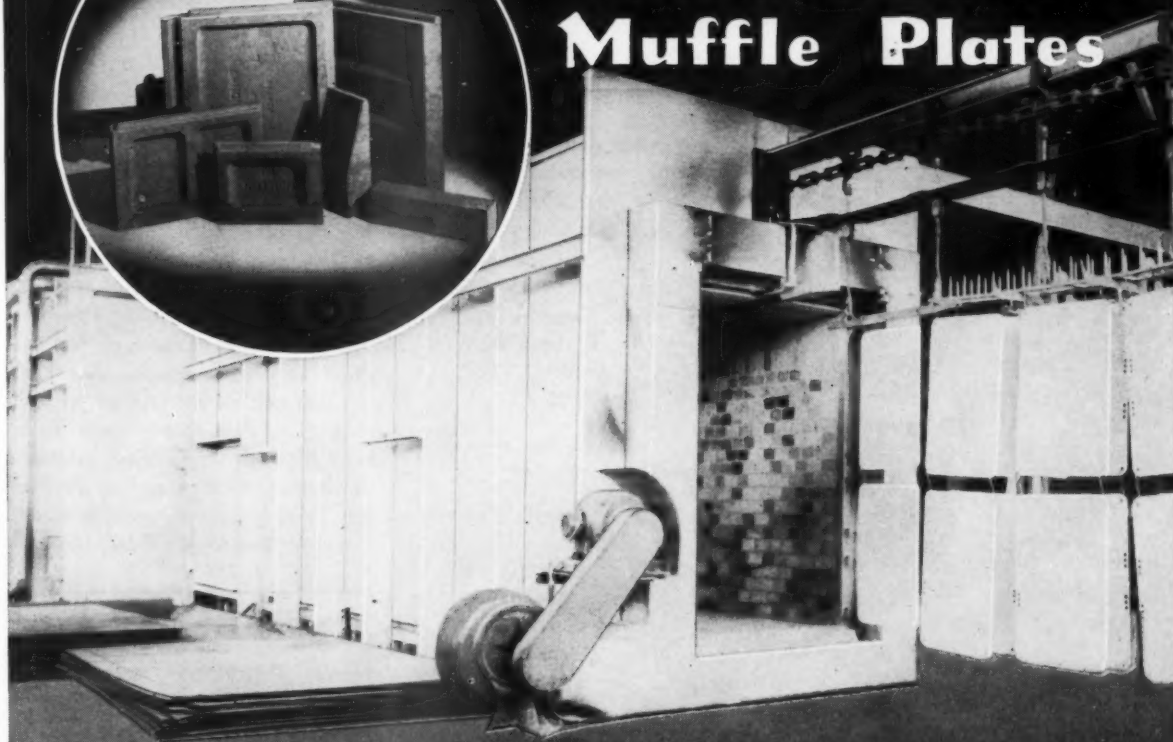
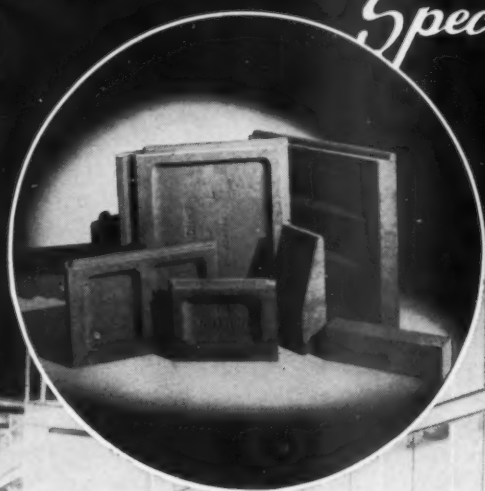
The gas industry is in much better position to meet added demand for house heating than at any time since the war, according to officials of the American Gas Association. Expansion of production and distribution plants, increased supplies of natural gas being piped from the wells, new

to Page 59 →



*Specified for Quality Enameling*

## **ALUNDUM Muffle Plates**



ALUNDUM Muffle Plates by Norton Company have been specified in Ferro Enameling Furnaces for more than a quarter of a century as essential equipment for quality enameling. Made of electrically fused alumina plus a highly refractory bond, ALUNDUM Muffles possess great refractoriness, chemical stability, physical strength and excellent heat transfer properties. Their strength permits thin cross-section for rapid passage of heat. They will give long, trouble-free service in either intermittent or continuous furnaces.

**NORTON COMPANY, Worcester 6, Massachusetts**

# **NORTON *Longer Lasting* REFRACTORIES**

## New Supplies and Equipment

### L-41. Infra-red heat lamps



A new 500-watt sealed-beam industrial heat lamp, made by Amplex Corporation, incorporates a new type of tungsten filament that has been especially constructed for infra-red heat lamp use, pretested for twist and sag, and built with a protective supporting structure which is said to have never before been applied to heat lamps. The inside of the bulb is lined with pure polished silver that acts as a built-in reflector that never needs cleaning since it is hermetically sealed and protected from dust, dirt and fumes.

### L-42. New device for determination of steam purity

A new device, designed primarily for use in determination of steam purity, has been announced by Hagan Corporation, a combustion and chemical engineering firm.

Known as the Hagan "automatic degasser," it is claimed to produce continuously and automatically an approximately 50-50 split of flowing steam sample—one fraction of the

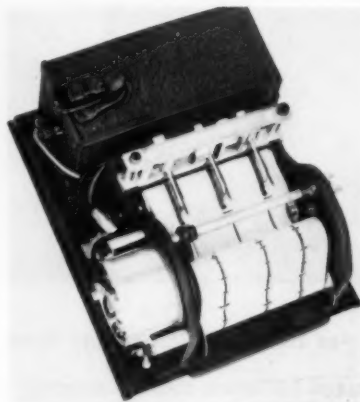
### More Information

For more information on new supplies, equipment and literature reviewed here, fill out the order form on this page.

condensed steam containing any dissolved solids that may be present, and the other any dissolved gases.

It is pointed out that a principal advantage is the new degasser's automatic operation. It does not require valve twisting or frequent attention. Its steam demand is about 30 pounds per hour.

### L-43. New machine for recording shipping "shocks"



A new device, called the Impact-o-graph, records impact to packaged products. Placed in a carton or crate, this compact instrument measures

impact or drop in three directions—forward and back, up and down, or sideways.

Three styli, or markers, record the extent of the impact on a calibrated tape. Down the sides of the tape the hours are marked off in segments of 15 minutes so that the approximate time of the drop can be recorded. The tape is driven by an electrically wound clock at the rate of one inch per hour. Sufficient tape is carried on the roll to last 28 days. The clock mechanism will operate continuously for over 60 days on one battery.

Two types of Impact-o-graphs are currently available—one for use within packages or crates, the other for railroad use to check on car handling, roadbed conditions, etc. Each is calibrated for the type of job it is to perform. The same chassis can be used for both purposes by substituting a conversion recording mechanism, according to the manufacturers, Cleveland Impact Recorder, Inc.

## NEW LITERATURE

### 120. Bulletin on "standardized" line of hydraulic presses

What is said to be one of the most significant developments for hydraulic press users in recent years is contained in a new bulletin published by Lake Erie Engineering Corp. Contents of the bulletin cover a standardized line of hydraulic metal forming presses which for the first time makes it possible for the limited volume metal products manufacturers to profit by the economies of such equipment which is normally custom designed to individual requirements.

The presses are available at present in 100, 150 and 200-ton capacities, with each of the sizes available with or without hydro-pneumatic cushion for deep metal drawing. It is stated that all models can be equipped with normal or high speed pumping units.

### 121. Completely new booklet on wirebound boxes and crates

A completely new booklet on "What to Expect from Wirebound Boxes and Crates" has just been published by

#### FINISH

360 N. Michigan Ave.  
Chicago 1, Illinois

Please forward to me at once information on the new supplies and equipment and new industrial literature as enumerated below:

No. \_\_\_\_\_ No. \_\_\_\_\_ No. \_\_\_\_\_ No. \_\_\_\_\_

No. \_\_\_\_\_ No. \_\_\_\_\_ No. \_\_\_\_\_ No. \_\_\_\_\_

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Company Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



# BINKS Dynaprecipitor Water Wash CERAMIC SPRAY BOOTHS



## NO OTHER SPRAY BOOTHS GIVE YOU ALL THESE ADVANTAGES

- 1 Approved performance and construction:** When you install a Binks Dynaprecipitor Spray Booth in your enameling department you have done everything possible to eliminate fire and health hazards. These booths meet the requirements of both local and state authorities...are endorsed by insurance companies. They are the mark of a safely equipped shop.
- 2 Exhaust air washed 5 times:** The patented Dynaprecipitor principle draws frit-laden over-spray through 5 unbroken water-curtains before it is vented...clean, odorless and dry.
- 3 No nozzles to clog:** The unique water distribution system in these booths eliminates nozzles...guarantees thorough washing.
- 4 Faster production:** Stops drift...lets you place spray stations closer to each other. Minimizes clean-up time.
- 5 Better shop morale:** There is no paint smell...air in the shop remains fresh...and the shop stays cleaner.
- 6 Reclamation of over-spray:** All frit in the over-spray is reclaimed. This is accomplished by exhausting the air through a specially designed system of baffles which trap the big majority of the frit. The remaining frit is washed from the exhaust air as it passes through five thorough washings in the booth.
- 7 Simplified construction:** Dynaprecipitor booths are shop fabricated in standard sizes from 4 to 20 feet long. Panels bolt together with gasketed joints, quickly and simply.
- 8 Priced right:** This is equipment on which you do not pay a premium to get the best. Dynaprecipitor spray booths are unsurpassed...but you don't pay any more for them.
- 9 Economical to operate:** The same water is recirculated. Only cost is operation of the circulation pump...which is specially designed of abrasion-resistant materials to provide long life.

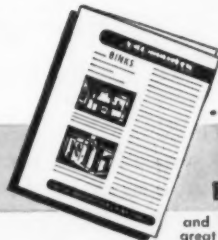
"We hope buyers will compare our Dynaprecipitor with other water wash booths. It's always very convincing!"

*J. P. Roche*  
Chairman of the Board

# Binks

MANUFACTURING COMPANY

3122-40 Carroll Ave., Chicago 12, Ill.



Send for  
BULLETIN 500

and see for yourself the many great advantages of these modern, well engineered spray booths. No obligation.

NEW YORK  
PHILADELPHIA

DETROIT  
PITTSBURGH

LOS ANGELES  
ST. LOUIS

ATLANTA  
ST. LOUIS

BOSTON  
SAN FRANCISCO

CLEVELAND  
SEATTLE

DALLAS  
SEATTLE

MILWAUKEE  
WINDSOR, ONTARIO, CANADA

NASHVILLE  
WINDSOR, ONTARIO, CANADA

Wirebound Box Manufacturers Association for the information and guidance of shippers and industrial packaging engineers.

According to L. S. Beale, secretary of the Association, the new book is a successor to "Your Product in Wirebounds," a new edition of which was issued just a year ago.

Mr. Beale stated that the new book is brand new from cover to cover. It is replete with photographs and shippers' reports of their accomplishments with wirebound shipping containers actually in use for a large variety of industrial products.

#### 122. New non-ferrous alloys pocket-size handbook

A convenient new 44-page pocket-size handbook, which the publisher states is warranted to take the guesswork and grief out of selecting and ordering non-ferrous alloys, has just been published by The Riverside Metal Company.

Included in the handbook are the advantages, applications, composition, forms, properties and manufacturing limits of Riverside alloys—Phosphor

Bronze, Nickel Silver, Cupro Nickel, and Beryllium Copper.

#### 123. Industrial electric heater catalog

A large number and variety of standard electric heating units, many of them entirely new, are listed in a new Chromalox catalog of industrial electric heaters just published by Edwin L. Wiegand Co.

There is shown complete assembled heating equipment, for example: A complete line of immersion heaters with forged steel and standard pipe flanges for use at high operating pressures and temperatures, and a new line of portable immersion heaters for use in drums and tanks.

#### 124. New engineering and production equipment booklet

Continental Industrial Engineers, Inc., consultants, engineers, and manufacturers of completely equipped plants, production lines, special machines and heat processing equipment, have issued a new 12-page booklet describing in detail the broad scope of their services to industry. Included

are many illustrations with detailed descriptions of a wide variety of production lines and automatic processing equipment covering practically every industry.

#### 125. Barrel tumbling manual

A barrel tumbling manual for bulk finishing of small parts has just been released by Frederick Gumm Chemical Co., Inc., manufacturers of barrel finishing supplies and industrial finishing chemicals.

#### 126. "Chemicals You Live By" described in new booklet

"The Story of the Chemicals You Live By"—a new 16-page booklet describing eight major groups of chemical products and depicting their diverse utilization throughout American industry—has just been issued by Diamond Alkali Company.

This booklet reviews soda ash, caustic soda, chlorine, bicarbonate of soda, silicates, calcium carbonates, chromates, and specialty chemicals, pointing up the economic significance of each group.

#### 127. Advantages of malleable iron castings told in brochure

A new brochure which describes the advantages of malleable iron castings and pictures the expanded and active facilities of Maumee Malleable Castings Company has just been published by that company for reference by purchasing agents and engineers. The brochure contains 17 photographs showing operations in various stages of casting production and illustrations of 44 typical castings produced by Maumee.

#### 128. Primers and primer surfacers described in new folder

A new folder describing the line of Zapon primers and primer surfacers has been issued by the industrial finishes division of Atlas Powder Company. Points on adhesion, corrosion and appearance are explained as being instrumental factors in the final selection of a primer, or primer surfacer.



# finish 17.5% AHEAD

*Business Paper*  
**Volume DOWN**

Advertising Age, October 10, 1949

## **Business Paper Ad Volume Down 8.6% During September**

CHICAGO—Although business advertising volume in September was off 8.6%, compared with a year ago, according to the monthly tabulation of lineage figures by *Industrial Marketing*. August volume was off 9.9%.

The 240 publications reporting carried a total of 26,570 pages of advertising last month, compared with 29,078 pages in September, 1948, issues.

Greatest loss was recorded by the 53 trade publications, with 5,887 pages this year, down 13.7% from the September, '48, total of 6,822 pages. The 141 industrial publications carried 16,937 pages, a decline of 7.9%. Class publications, including 27, showed the smallest decline, 2.2%; they carried a total of 2,425 pages, compared with 2,480 pages a year ago. The 19 export publications were down 4.3%, carrying 1,321 pages last month, compared with 1,381 pages a year ago.

The first nine months of the 240 publications are off in ad volume, with export showing the largest decline of 18.6% during the nine-month period, compared with 13.2% a year ago, a 12.5% loss.

Industrial group, with 148, compared with 158, was down 5.8%. Trade carried 52,929 pages, with 58,110 pages, and class papers were a total ad volume of 1,321 pages, compared with 1,381 pages a year ago.

According to the *Industrial Marketing* report covering 240 business publications, advertising volume continues to be slightly off when compared to similar periods for 1948. In contrast to this, *finish* advertising continues to lead 1948 by a healthy 17.5%.

The 17.5% advertising gain in *finish* covers a full ten issues for 1949 as compared to the ten corresponding issues in 1948. Add this to the fact that *finish* advertising in 1948 was over 50% ahead of 1947 and the trend to *finish* is apparent.

There's good reason for *finish* being AHEAD. *finish* is the *only* industrial trade publication which completely blankets the major appliance and allied metal products field both circulation-wise and editorially.

More and more companies who have materials, equipment, components or services to sell to this broad market are discovering that one publication — *finish* — can do a more thorough job in helping build sales volume than multiple "broad" publications at various levels.

Important, too, is the fact that the job can be done at extremely reasonable cost.

*Dana Chase* PUBLICATIONS

360 NORTH MICHIGAN AVENUE • CHICAGO 1 • ILLINOIS  
TELEPHONE Central 6-1229

FOR DETAILED  
REFERENCE DATA  
SEE  
INDUSTRIAL MARKETING'S  
Industrial  
MARKET DATA  
BOOK NUMBER



## Enameled art prize winners

at 14th national Syracuse exhibition



**P**HOTOS on this page show prize winners in enamel-to-metal art class at the 14th National Ceramic Exhibition which opened October 30 at the Syracuse Museum of Fine Arts, Syracuse, New York. The Exhibition closes December 4 when the winning entries will be taken on a tour of the country.

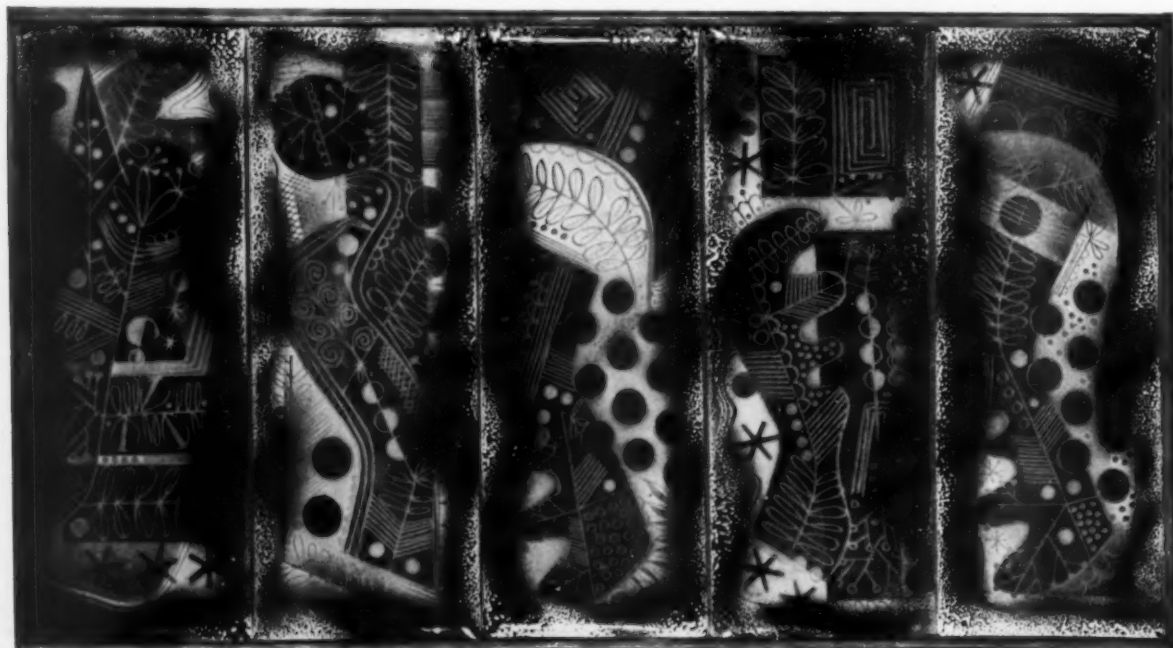
Arthur Ames, of Claremont, California, was awarded a \$100 prize,

presented by Ferro Enamel Corporation, for his three enamels on copper (above left). Top left is "Variation on a Mood"; lower right, "The Darling Young Girl"; and right, "Repast".

Jackson Woolley, of La Jolla, California, was awarded a \$100 prize, presented by B. F. Drakenfeld & Co., for three enamel plates on copper (above right), and Ella Marie Woolley received an honorable mention for

enamels with her enamel plate of "The Prophet," also shown above. Mr. Woolley's enamels were: left, "The Fish"; top center, "Figures in Landscape"; and bottom, "Boadicea".

H. Edward Winter, of Cleveland, Ohio, received an honorable mention for enamels with his panel (below) in gold tones on copper which is 31 inches long by 17 inches wide.





## NEWS → from Page 52

manufacturing processes and increased storage facilities have helped lift restrictions on sales of new gas heating in most areas, it was stated.

### Memco celebrates 25th birthday

The Moore Enameling & Mfg. Co., West Lafayette, Ohio, is celebrating its 25th anniversary this year.

In 1924, a total of only 24 employees were required to tend four single fork furnaces housed within a building of only a few thousand feet of floor space.

In 1949, an impressive 180,000 square feet of fairly bulging with people, streamlined equipment, and activity. Today, Memco is 20 times larger and production is 40 times greater.

### Koppers appointments

Koppers Company, Inc. has announced the appointments of Fred Denig, vice president, as manager of the firm's production department, and Dr. G. Frank D'Alelio as vice president and manager of the research department, the position formerly held by Denig. Brehon Somervell, Koppers president, said the changes were made necessary by the resignation, due to ill health, of Hugh C. Minton, vice president and head of the production department.

Joseph Becker, vice president and general manager of Koppers' Engineering and Construction Division, also announced the appointment of J. Hawley Taussig, Jr. as gas engineer. Taussig formerly was assistant engineer of works for Philadelphia Gas Works Co.

### Atlas Powder appointment

John A. Stierstorfer has been appointed senior synthetic enamel chemist at the Stamford (Connecticut) branch of the industrial finishes department of Atlas Powder Company. Stierstorfer's experience includes a dozen years in the development laboratories of eastern and midwestern finish and paint manufacturers.

### Gunnison Homes names Sammerdyke executive vice president

Frederick J. Sammerdyke was elected executive vice president of Gunnison Homes, Inc., prefabricated housing subsidiary of United States Steel, at a recent meeting of the board.

He has been associated with the organization for more than two years.

Dr. Edwin L. Gustus, vice president, Bjorksten Research Laboratories, recently returned from a trip to Mexico and Cuba.

### Steel Founders Society holds national technical and operating conference

Intensive research and product development activities pointing the way to increasingly substantial reduction of production costs, impressive improvements in the quality of cast-to-shape steel products, and broadly expanding knowledge and understanding of the advantages of cast steel in modern engineering design, were dramatically emphasized at the 4th annual Technical and Operating Conference of the Steel Founders Society of America, held in Cleveland, Ohio, recently.

Constituting a representative national gathering of the top management, technical and operating executives of the steel casting industry, including virtually all segments of the industry on a national basis, conference attendance established a near-record of 315 registrations.

During the two and one-half day sessions, more than 40 technical papers and individual discussions were devoted to technical problems, and to

to Page 62 →



Merry Christmas



# Friend!

Merry Christmas Friend! May we clasp  
your hand in Friendship and wish you a  
Christmas of Happiness—a future of Peace  
and glorious Health and the Courage to  
face your daily problems, firmly believing  
in a Spiritual Power greater than your own.  
May the coming year leave its imprint in  
memories you will always want to recall.

PEMCO CORPORATION



→ from Page 59

specific developments and advances arising out of 21 major research projects carried out under Society auspices in recent times. While the broad scope of subject matter included virtually the entire field of modern steel casting technology, particular emphasis was directed to newly completed exhaustive research on metal fluidity and temperature control, detailed considerations of cost reduction and product improvement through application of specific research in steel casting production, proven methods of redesigning, conversion and reconversion to steel castings, and new developments in foundry practices and equipment.

Of special interest was a session concerned with the Society's extensive product development program. This preceded and served as fitting introduction to the provocative consideration of typical conversion examples described in detail by spokesmen for each of the eight regional divisions. An unusually informative "Do You

Know?" panel-quiz session, comprising a seven-subject discussion of fundamentals developed by the Society's research reports, also heightened interest and enabled audience participation via a true-or-false questionnaire, which in turn served to re-focus attention on the importance and usefulness of the Society research reports on specific projects as a reliable source of cost-saving and improved production data.

#### **Color movie on flow of molten steel in sand molds**

The first technical session featured the initial showing of a 45-minute motion picture film, devoted in its entirety to an extraordinary visual record of the mechanics of "The Flow of Molten Steel in Sand Molds."

Produced by Armour Research Foundation under the direction of Charles Locke and William W. Wick, as Research Project No. 18 sponsored by the Society, the 16 mm color movie is considered an exceptional undertaking, and a material addition to the

information previously available on flow of molten steel in various gating systems, and the foundryman's understanding of the phenomenon. The Society studies via the movie were so planned as to permit observation of the metal flow patterns and surfaces of the resulting castings as well as the action at the gate openings.

At a panel session, R. J. Wilcox, technical director, Michigan Steel Casting Co., Detroit, delivered a paper on "An Investigation of the Surface Finish of Steel Castings," as developed in Research Report No. 19 of the same title.

"Mallabrative Shot vs. Chilled Shot" in modern cleaning room practice was the subject discussed by H. G. Stevener, of American Steel Foundries, Alliance, Ohio. He said that experience suggests that three factors are involved in obtaining best results in shot blasting from a cost stand point: efficient equipment, proper abrasive, and a shot reclaimer to reclaim all possible shot from the floor and other parts of the shop.

## **For EVERY metal-cleaning job there is an EFFICIENT Oakite method:**

- Precleaning in tanks
- Precleaning in machines
- Alkaline cleaning in tanks
- Alkaline cleaning in machines
- Pickling     • Barrel cleaning
- Steam-detergent cleaning

**FREE** There is no charge for Oakite advisory service on these or other metal-cleaning methods. Just write to Oakite Products, Inc., 17 Thames St., New York 6, N. Y.



# **OAKITE**

INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in  
Principal Cities of United States and Canada

### **New "Court of Flame" Program**



Miss Railroad Fair of 1949 is shown aboard the "Court of Flame" Special as part of the promotion of the new "All Aboard" automatic gas water heater sales contest which opens March 1 and continues to September 31. The campaign is being conducted by the Gas Appliance Manufacturers Association and its participating gas water heater manufacturers.



### New factual book on titanium

What is said to be one of the first complete and authoritative compilations of factual material on "Titanium, Its Occurrence, Chemistry, and Technology," has just been written by Jelks Barksdale, Ph.D., of Alabama Polytechnic Institute, and former research chemist of the Titanium Division of National Lead Company.

In its broad scope, Barksdale's 570-page volume includes information on such aspects of the element as its discovery, its geology and mineralogy, production and treatment of ores, its chemistry—oxides, salts, and organic compounds—and chemical analysis methods.

It details the processes of manufacture and uses in such industrial fields as paints and pigments, ceramics and glass, electrical manufacture, iron and steel, hard alloys, non-ferrous metals, mining, food processing, paper, plastics, soaps and cosmetics, textiles, leather, mordants, and dyes, catalysis, and other special applications.

### Defense officials see electronic demonstration by Philco men

Top civilian officials and high-ranking officers of the Army, Air Force, and Navy were guests of Philco Corporation at a three day meeting in Hotel Carlton, Philadelphia, the second week of November. These officials of the Services had requested to see exhibits of the worldwide activities of Philco electronic field engineers serving with the Armed Forces, and of the company's

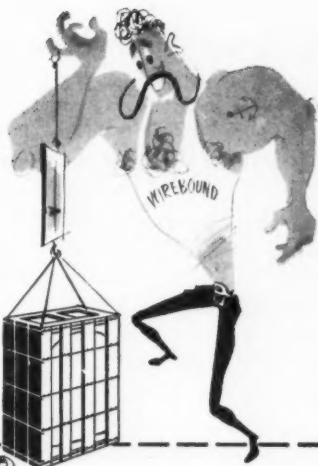
to Page 67 →



finish DECEMBER • 1949

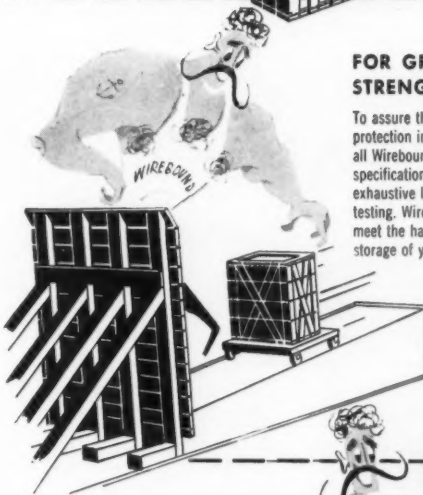
### FOR LOWER TARE WEIGHT

Users of Wirebound Boxes and Crates consistently save 33% on tare weights. In addition, Wirebounds require less storage space, are easily handled, can be set-up in less than a minute, and are ideally suited to modern warehousing.\*



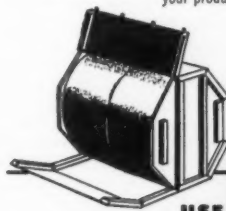
### FOR GREATER STRENGTH

To assure the utmost product protection in handling and shipping, all Wirebounds are constructed to specifications developed by exhaustive laboratory and field testing. Wirebounds are designed to meet the hazards of shipment and storage of your particular product.\*



### FOR FRAGILE PRODUCTS FOR HEAVY PRODUCTS

The adaptability of the Wirebound principle is demonstrated by the variety of containers shown here. Heavy products, delicate products, products of odd or irregular shapes ship safely and at lower cost in Wirebounds. Ask us for suggestions on shipping your product.\*



USE

60 Wirebound Plants throughout the United States

**Wirebound**  
**BOXES & CRATES**  
FOR LOWER TOTAL SHIPPING COSTS

\*Send for this free book... contains the full Wirebound story, technical information and demonstrates how Wirebounds are specifically designed for each product. Mail coupon today!

Wirebound Box Manufacturers Assn., Room 1832 Borland Bldg., Chicago 3, Ill.

☐ Send Booklet of Product Information ☐ Send a Sales Engineer

NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_ ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_  
OUR PRODUCT IS \_\_\_\_\_

## Pickling sheet steel prior to finish application

(Continued from Page 40)

tially higher cost, acid salt compounds have proven economical to use for several reasons:

(a) Longer life expectancy of acid salt over sulfuric acid (in ratios from 4:1 to 9:1).

(b) Lower maintenance of solution.

(c) Freedom from corrosion and lower equipment maintenance.

(d) Safety factors and more de-

sirable working conditions.

(e) Less frequent neutralization and dumping of spent pickle liquors.

### Two pickling compositions recommended

Depending on the type of surface required, there are two pickling compositions recommended: one for general purpose on regular enameling

iron, and the other accelerated for deep etching or for etching hard rolled sheet steel. The basis for this latter composition is: in a simple voltaic cell consisting of copper and zinc electrodes in a solution of dilute sulfuric, the hydrogen gas liberated from the copper plate sticks to it in considerable quantity and covers the surface after the cell has been sending current for some time. This phenomenon is objectionable for two reasons in electrochemical processes: (1) it increases the internal resistance of the circuit since gasses are poor conductors, and (2) it creates a counter EMF and reduces the efficiency. The same phenomenon exists in a pickling tank, which in many respects parallels a voltaic cell with the work considered as the electrodes in an ionized solution.

In pickling, the nascent hydrogen may tend to build up as a film that insulates the work from contact with fresh acid solution. In many respects it acts as an organic inhibitor. In fact, the prevalent theory of the function of organic inhibitors is based on the phenomenon of hydrogen over-voltage, or internal polarization, as it is called. The most successful remedies against internal polarization are both chemical and electrochemical. Highly oxidizing substances added to an ionized solution will destroy the hydrogen while in the nascent state, rendering it molecular, usually with the formation of water. Such oxidizing or depolarizing agents are the basis for so-called "pickling accelerators." Certain reducing agents exhibit this same property. Plant men are familiar with the practice of adding iron sulphide to sulfuric acid pickles in the holloware industry to generate hydrogen sulphide and roughen the surface. The purpose in adding an accelerator (a metallic salt) to acid sulphate is to produce a deeper etch than is normally produced by the salt itself in solution. It might be well to point out at this time that the phenomenon of polarization is closely associated with hydrogen embrittlement, or hydrogen occlusion. Increasing temperature in an acid solution greatly increases speed of

HIGH QUALITY ZIRCONIUM SILICATE OF MAXIMUM PURITY

# Orefraction Zircons



TRADE MARK  
U. S. PAT. OFFICE



**For LOW COST PRODUCTION of**

• ENAMELS	• REFRACTORIES
• GLAZES	• ELECTRICAL CEMENTS
• OPACIFIERS	• ELECTRICAL PORCELAINS
• GLASSES	• ABRASIVE WHEEL BONDS
• SPARK PLUGS	• LABORATORY WARE

When you specify "Orefraction," you are assured pure and clean Zircons of maximum purity. Exclusive preparation, separation and beneficiation methods, plus fine petrographic, chemical and particle-size controls, make Orefraction Zircons uniformly high in quality. Orefraction Zircons meet your most exact requirements.

**Prompt Delivery In Carload Or Less-Than-Carload Lots**



**OREFRACTION CERAMIC ENGINEERS  
WILL WORK WITH YOU**

Orefraction technological, research and production facilities are at your service. We welcome the opportunity of working with you in developing new uses and in improving present uses for Orefraction Zircons and Rutiles.

**SEND FOR WORKING SAMPLES**

A DEPENDABLE SOURCE FOR ZIRCONS AND RUTILES

## Orefraction Inc.

7426 THOMAS STREET • PITTSBURGH 8, PENNSYLVANIA  
Telephone: PEnhurst 3200 • JACK HUNT, Manager

hydrogen absorption, whereas increasing acid strength has little effect on speed of absorption. There are, however, instances where too low an acid concentration will produce embrittlement, due perhaps to the phenomenon of low ionization pressure and low mass effect.

#### Smooth vs. etched metal surfaces

In some fields of metal finishing, it is axiomatic that the smoothness of the finish is a definite function of the underlying metal surface. This is true in the electroplating field where the electrodeposit is only as smooth as the metal surface onto which it is plated. In the field of hot dip coatings, however, there are two schools of thought on pickling: one school wants the ware chemically and metallurgically clean, with an etch; the second group wants an etched surface to promote better adhesion and good bonding. This last opinion is hardly supported by research facts. In both tinning and galvanizing, the high spots or ridges on an etched surface are so rapidly oxidized as to be washed away. Alloying between the tin or the zinc and the base metal then proceed on a relatively smooth surface as a strictly metallurgical process. And the oxidized particles merely serve to foul up the kettle by forming dross. These facts are proven fairly conclusively by metallographic studies.

This brings to mind the question: just how essential is an etch to good adhesion and bond in the field of porcelain enameling? While it is commonly accepted that the metal should be etched to promote good bond, there are some in the field who maintain that if the surface is cleaned of dirt (organic or inorganic), then optimum adherence is attainable. Such practice is part of daily production. This argument resolves itself down to the question of whether the bond is strictly chemical, or physico-chemical. This is a question I would like to pose for further industry discussion.

Adapted for *finish* from a paper before the Central District Enamellers Club.

### Sixth refrigeration, air conditioning exposition

→ from Page 43

power and resources to meet those demands of progress is thus one of the major problems now facing American agriculture, industry, and commerce . . .

"During the depression of the 1930's, we as a nation suffered from conditions which prevented our utilizing fully the initiative, enterprise, and genius of business management . . .

It took a war to uncover quickly and put to work the fire in business leadership . . .

"The solution to any unemployment problem which may arise and to the problem of increasing the standard of living is the judicious and progressive investment of private capital in private industry, thus providing for new enterprises and for the expansion of existing ones with the attendant job creation and added production," emphasized Cox.

## GOOD HINGED CRATES SAVE TIME AND MONEY



Tight Corner Hinged Crate



Kraft Crate

Yes—good hinged crates do save time and money. They save time in product packaging through rapid assembly. They save money too in storage space, but most important of all they save money by getting the product to its final destination free of damage.

Bigelow-Garvey crates are good crates, for they are properly designed for your particular product, and (built of the finest packaging materials) accurately manufactured in all details.

Our Tight Corner Hinged Crate offers rigidity, strength, lightness

and ease of assembly not found in ordinary crates. Even the nail holes are pre-drilled for speedy assembly.

Our Kraft Hinged Crate for completely closed packaging has only three sections—top, bottom and collapsible mat. And it is reinforced with both horizontal and vertical wood cleats.

For stoves, ranges, heaters, refrigerators, washers, ironers—for appliances and household products—use Bigelow-Garvey crates for speed, economy and safe shipment.

Your shipping problems are our problem. Write us fully.

## BIGELOW-GARVEY LUMBER CO.

General Office and Laboratory

320 West Huron Street • Chicago 10, Ill.

Mills • Arkansas • Georgia • Wisconsin • Minnesota • Washington



## Eighteenth annual meeting of the PEI

(Continued from Page 35)

was under the chairmanship of G. H. McIntyre. It was this committee that sponsored the annual forum for plant men at Ohio State University, September 14, 15 and 16.

A change in name has been suggested for this valuable contribution to industry activity, the suggested new name being "Shop Practices Forum".

The beneficial influence of this

annual meeting on the progress of the appliance and porcelain enameling industries is universally recognized.

As President Meacham takes up the gavel of the PEI for the further development of the Institute, *finish* will keep its readers informed of committee appointments and activities and the progress of this cooperative organization.

# WE WILL PROVE YOU CAN REDUCE COSTS with FIBER-and-STEEL Strapping



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## NEWS→ from Page 63

research, development and production of new radar, radio and electronic equipment for the Government.

"There are now about 600 Philco electronic field engineers or 'tech reps', as we call them, on duty at American outposts from Japan to Saudi Arabia," declared Robert F. Herr, vice president of Philco's industrial division.

### Residential electricity users rise to 35 million

During the past 20 years, the number of residential customers served by the electric light and power industry has increased 75 per cent from 20 million to 35 million, Elmer L. Lindseth, president of Edison Electric Institute, revealed recently.

Mr. Lindseth reviewed the progress, status, and future of the industry on the occasion of the 70th anniversary of the invention of the incandescent electric lamp by Thomas Edison.

### Chicago Vit appoints two new district managers

Wesley L. Dinsmore and William L. Donaldson, former service engineers of Chicago Vitreous Enamel Product Co., have been appointed district managers, according to an announcement by A. S. Ault, manager of sales and service. Dinsmore is now district manager of the New England territory and Donaldson is manager of the east central states territory.

### AES sponsoring research on disposal of plating room wastes

The American Electroplaters Society is sponsoring a research project on the "Disposal of Plating Room Wastes." The object of this project is to evaluate known methods for treatment of plating room wastes and to attempt to develop new methods of treatment. The two factors being given greatest consideration are the efficiency of the treatment and its cost.

At present, one full time chemical engineer and one associate are actively engaged on this project. Much experimental work has been done on the destruction of cyanides by vari-

ous methods. A procedure has been worked out for determining very small amounts of cyanide and this will be published shortly, it was stated.

### Eastern enamelers to hold first fall meeting, December 3

Members of the Eastern Enamellers Club are reminded that their first fall business meeting will be held Saturday, December 3, at the Hotel Sylvania, Philadelphia, starting with lunch at 12:30 p.m., following which

a "panel of experts" from Westinghouse Electric Corp. will discuss "Titanium Enamel and Its Application Direct to Steel."

### Yale & Towne appointment

Milo F. McCammon, prominent in the automotive, aircraft and steel processing industries for almost 20 years, has been appointed general manager of the Stamford Division of The Yale & Towne Manufacturing Co., it was announced by Gilbert W. Chapman, president.

## SPARKLER *horizontal plate* FILTRATION

Plating solutions are circulated through this battery of Sparkler Filters in the Lukens Company plating plant at the rate of 5000 gallons per hour.



*..... means cleaner surfaces  
for cladding steel .....*

Lukens Steel Company, pioneer manufacturer of clad steels, has found that Sparkler Horizontal Plate Filtration is important in the production of Inconel-Clad and Stainless Clad Steel.

Here's the way it works:

Oxide film, which forms easily on the bonding surfaces of all steels, acts to prevent a strong, intimate bond between these cladding metals and backing plates. Lukens, to overcome this, applies a nickel plate finish to these bonding surfaces. In the new, modern Lukens plating plant, Sparkler filters serve as assurance that this nickel plate will be perfectly clean and free from foreign matter, thus providing the best possible surface for an inseparable bond.

The horizontal plate principle used by Sparkler makes possible the formation of firm, stable filter cakes that will not slip or crack under intermittent or continuous flow. Flow through the filter is always *with* gravity, and filter aid is floated into position, forming a strong cake of even thickness that effectively removes all solids and precipitates from plating solutions. Filters are pressure-tight and leakproof, and are available in rubber-lined construction, stainless steel, or iron. Capacities from 60 to 10,000 G.P.H.

Our Engineering Service is available for your specific problems.

**SPARKLER MANUFACTURING COMPANY**  
Mundelein, Illinois

## Adherence of glass to metal

→ from Page 41

may result in poor adherence.

The clear glasses that are used do not contain any known adherence-producing oxides. Adherence is not developed unless the metal is properly oxidized. This involves a definite step since the normal oxidation of the metal prior to its wetting by the fused glass is insufficient. Also, once the glass comes in actual contact with the metal it is known to protect it from further oxidation. Experiments have also shown that seals made in hydrogen have poor adherence, that the glass does not wet the metal.

On the basis of the above evidence plus others the oxide layer theory has been most commonly supported. Again, as in porcelain enamels the oxide is said to be the bond between the metal and glass.

### Suggested theory of adherence of glass to metal

Both theories, the oxide layer and the mechanical bonding, have merit. Good experimental evidence has been obtained in favor of each one. Per-

haps in some cases the viewpoint has been too narrow in a desire to prove a certain point. In view of the mass of experimental evidence in favor of both theories, the logical conclusion would be that the ideas presented in support of both theories are necessary to explain adherence.

Analyzing the data presented in the literature and information obtained from experimental work on glass-to-metal seals the following theory for adherence of glass to metal is proposed. It is threefold. First, oxygen, either adsorbed or as a definite oxide layer, is necessary for the glass to wet the metal. Adherence, even without any definite visible or measurable oxidation, is thus obtained, although it is very poor. Secondly, in order to improve adherence, the metal has to be roughened in some way to develop a mechanical gripping. And, thirdly, if a definite oxide layer is present, the glass must have a high enough solubility for the oxide and a definite penetrability in order to come in contact with the roughened metal.

The main question is how does the

mechanical roughening occur, in support of the second point of the theory. Most of the experimental evidence appearing in literature deals with this problem knowingly or unknowingly. In working with alloys, adherence is developed by applying clear glasses to oxidized surfaces. Roughness is developed by preferential oxidation of the alloy resulting in oxidation penetration along grain boundaries which in turn causes reentrant angles for the glass to cling to when frozen. For instance, oxidation of Kovar, a cobalt-nickel-iron alloy, results in an oxide layer predominantly iron oxide and an alloy surface predominantly cobalt and nickel.

In working with relatively pure metals, such as iron, oxidation of the surface is smooth with little or no penetration along the grain boundaries. Therefore, oxidation in porcelain enameling does not produce adherence as it does in glass-to-metal seal technology. Porcelain enamels thus produce roughness at the metal surface with the aid of addition of CoO to the glass. Co in this case may

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possibly perform two or one of two functions. First, it may cause the precipitation of iron particles or dendrites at the interface. Secondly, it may somehow exhibit a tendency to alloy with the iron at the interface and along grain boundaries resulting in a miniature type of preferential oxidation with the ultimate result of penetration along grain boundaries producing the desired roughness.

Nickel-plating may play a similar role. A thin deposition may result in a thin layer of alloy with some penetration along grain boundaries. Subsequent oxidation thus results in preferential attack. Thus, the nickel helps promotion of the action of the Co. A thick layer of nickel again produces the situation of a pure metal, but even more of a problem than iron because of its much slower oxidation rate.

In any case excess oxide is undesirable since the glass cannot penetrate it to come in contact with the roughened metal surface. When this occurs, poorer adherence is realized since the strength of the oxide layer is lower than that of the normal system. Furthermore, it is quite likely that, considering the relatively short time of firing and the concentrated form of oxide at the contact, all of the oxide is not taken into solution even in a good seal. In such cases it is visualized that the glass has penetrated the oxide to come in contact with the metal, thus engulfing the oxide. Therefore, tests may show the presence of iron oxide but it may not be continuous.

In conclusion, the criteria for the suggested theory of adherence of glass to metal is: wettability of metal by glass in the presence of oxygen, roughening of the surface of the metal to develop maximum adherence, and solution or penetration of existing oxide layers. The first and third parts generally do not present a serious problem. The experimental work performed in porcelain enamels to produce adherence has been done to make the second part work: i.e., development of roughness in the metal-glass interface.

Summary of a paper presented before the Pacific Coast Enamellers Club.

finish DECEMBER • 1949



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## **Spraying technique for porcelain enamels and synthetic finishes**

*(Continued from Page 32)*

operation but rather one to be worked out carefully and leisurely. Hurried extreme changes one way or the other may only result in trouble.

The opportunity to plead for the industry to determine the best method of slip control and then have it standardized cannot be overlooked. In the organic field this has been pretty well accomplished by the use of a flow cup. While this is not assuring the best slip conditions it can be set up as a standard for future mixes. Some firms are testing this idea.

### **Spraying technique**

In low pressure spraying in addition to the change of equipment and the control of the slip, it is highly important to alter the spraying technique so as to produce results, maintain production and attain a quality finish.

It may be necessary to completely revamp old methods of spraying. When one lowers the atomization pressure from whatever is on the main line to a controlled 50-60 pounds, when the spray gun is brought to within 10 inches of the surface instead of the 18-22 inches commonly used, when one goes over the surface with steady uniform strokes instead of the fanning-arm-waving-type, there is a job of re-education to be done. This will require time and patience. The operators will have to understand the aim and purpose of the change. They will find in a short period of time that by the elimination of waste motion, and consequently energy, it is easier and less tiring to spray the low pressure way.

So the changes in technique that will occur are (1) change to the most effective air cap and metering tip in spray gun, (2) adjust the fluid pressures to meet conditions, (3) bring the gun closer to the surface, (4) apply the desired coating by deliberate uniform strokes, (5) avoid the fanning method, (6) hold gun perpendicular to the surface at all times, and (7) apply the required coating

in one pass by proper timing of the stroke and by the correct lap.

A change as radical as this may not be possible to accomplish over night. To every action there is a reaction and you may have some reaction. But by patience and encouragement the transformation can be accomplished and the results will wholly justify having made it.

### **Savings effected**

Low pressure spraying cannot be advocated without some good reasons to justify its use. There are good reasons—and they are the economies effected and the quality results obtained. These economies are in equipment, material and labor.

With smaller width of spray patterns, the amount of material handled through the spray gun is reduced and the wear on the parts contacting the material consequently lessens and replacements are less frequent. As the spray width is reduced and the

proper spraying technique employed, there is less material shot past the article coated and consequently less reclaim. Less reclaim means lower material cost and less labor involved in its processing. Lower pressures mean less air consumption by the spray guns and this is reflected in the reduction of power consumption. Proper technique means less fatigue to the operators and as a result more efficient operation throughout the day. More careful application results in fewer rejects and the welcome savings thus involved.

Low pressure spraying has advantages to justify checking into it. Changes in equipment would not be expensive. Controlling the material mix is considered essential by many but practiced by few although admittedly it can be an influencing factor in quality control. Spraying technique can readily be changed, requiring only time and patience. The savings possible are manifold and whatever economies can be effected are desirable to influence production, costs, selling prices, and profits.

### **Part II**

## **Control of spraying technique for synthetic finishes**

Reference to new materials in the organic finishing field is to the synthetic enamels. Those in organic finishes have made great strides in the past decade with new materials. These materials are more acid and alkali resistant; withstand abrasion and scratching under average conditions; some even withstand considerable heat; stand up well under aging and discoloring tests.

In the application of these enamels, the various controls recommended are almost universally adhered to. By these controls are meant:

- (A) The control of material and thinners used.
- (B) Control of the temperature of material.
- (C) Control of viscosity of material.
- (D) Control of fluid and atomizing pressures.
- (E) Control of technique of spraying.

By the first control is meant a laboratory control assuring uniform qual-

ity and consistent formulation.

The temperature control is maintained by acclimating the material to room temperature by storing in heated space. Cold material drawn from warehouses and immediately put into service without raising its temperature only leads to poor spray results.

Viscosity of material is the responsibility of the mixing room foreman who maintains a constant reading on his mixes. Many plants use the circulating system of paint distribution which facilitates maintaining viscosity control. Viscosity readings are by flow through an orifice. There are several such devices on the market known as Ford, DuPont and Zahn cups. In this viscosity measuring device, a small quantity of material is allowed to flow through a certain size orifice and timed. By checking the material when its consistency has been found satisfactory, a standard can be set up to serve as future guide.

Fluid pressures control the flow to

to Page 72 →



**What other Christmas present  
can you name that...**



... you wouldn't want to exchange



... comes in so handy on rainy days



... never wears out



... keeps increasing in value

... is so quick and easy to buy  
... pleases everyone on your list  
**AND ... gives itself all over again**  
(with interest) ten years later?



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ARMCO STEEL CORPORATION .....	1
BATH COMPANY, THE CYRIL .....	00
BIGELOW-GARVEY LUMBER CO. ....	65
BINKS MANUFACTURING COMPANY .....	55
BOLAND COMPANY, ALBERT J. ....	00
CARNEGIE-ILLINOIS STEEL CORPORATION .....	00
CENTURY VITREOUS ENAMEL COMPANY .....	15
CERAMIC COLOR & CHEMICAL MFG. COMPANY .....	8
CHICAGO FOUNDRY COMPANY .....	2nd COVER
CHICAGO MILL AND LUMBER COMPANY .....	00
CLASSIFIED ADVERTISING .....	11
CLEVELAND PUNCH & SHEAR WORKS CO., THE .....	72
COWLES CHEMICAL COMPANY .....	00
DE VILBISS COMPANY, THE .....	7
DETROIT BRASS & MALLEABLE WORKS .....	9
DETROITER HOTEL .....	68
DRAKENFELD & CO., INC., B. F. ....	00
DRIVER-HARRIS COMPANY .....	00
FAHRALLOY COMPANY, THE .....	00
FERRO ENAMEL CORPORATION .....	00
FINISH .....	57
GENERAL BOX COMPANY .....	00
GERRARD & COMPANY, A. J. ....	66
GLIDDEN COMPANY, THE .....	00
GRAND RAPIDS BRASS COMPANY .....	00
GREAT LAKES FOUNDRY SAND COMPANY .....	00
HARSHAW CHEMICAL COMPANY, THE .....	2
HOMMEL COMPANY, THE O. ....	13
HUYCK CONSTRUCTION COMPANY .....	00
IMPACT REGISTER CO., THE .....	00
INDUSTRIAL FILTER & PUMP MFG. CO. ....	5
INGERSOLL STEEL DIVISION, BORG-WARNER CORPORATION .....	00
INGRAM-RICHARDSON MFG. CO., OF INDIANA, INC. ....	51
INLAND STEEL COMPANY .....	18
ISLAND EQUIPMENT CORPORATION .....	00
INTERNATIONAL NICKEL COMPANY, INC., THE .....	6
KRAFT CHEMICAL COMPANY .....	00
L.A.B. CORPORATION .....	00
LAWDALE ENAMELING COMPANY .....	00
LINK-BELT COMPANY .....	00
LOCKE, INCORPORATED .....	10
LOGAN ENGINEERING CO. ....	00
MAC DERMID, INCORPORATED .....	00
MAHON COMPANY, THE R. C. ....	44
McDANIEL REFRACTORY PORCELAIN COMPANY .....	16
METAL & THERMIT CORPORATION .....	00
METALLOY CORPORATION .....	00
METALWASH MACHINERY CORPORATION .....	00
MICHIGAN STEEL CASTING CO., ROLLED PRODUCTS DIVISION .....	68
MID-WEST PORCELAIN ENAMEL CO., INC. ....	00
MULLINS MANUFACTURING CORPORATION .....	00
NEW MONARCH MACHINE & STAMPING CO. ....	38
NORTHWEST CHEMICAL COMPANY .....	00
NORTON COMPANY .....	53
OAKITE PRODUCTS, INC. ....	62
OLSON MFG. CO., INC., SAMUEL .....	00
OREFRACTION, INC. ....	64
OWENS-CORNING FIBERGLAS CORPORATION .....	00
PATTERSON FOUNDRY & MACHINE CO., THE .....	00
PEMCO CORPORATION .....	60 & 61
PENNSYLVANIA SALT MANUFACTURING COMPANY .....	00
PERMANENT METALS CORPORATION .....	00
PHEOLL MANUFACTURING COMPANY .....	00
PORCELAIN ENAMEL FINISHERS .....	00
PORCELAIN ENAMEL INSTITUTE, INC. ....	12
PUNDERSON COMPANY, V. B. ....	00
QUINN COMPANY, THE DON L. ....	00
RATHBORNE, HAIR AND RIDGWAY COMPANY .....	00
RICHARDSON COMPANY, THE .....	00
ROBERTSHAW-FULTON CONTROLS COMPANY .....	00
ROTOSEAL MANUFACTURING COMPANY .....	21
SKELNOR METAL PROCESS CO. ....	00
SPARKLER MANUFACTURING CO. ....	67
TINNERMAN PRODUCTS, INC. ....	00
TITANIUM ALLOY MFG. DIVISION, NATIONAL LEAD COMPANY .....	4
TITANIUM PIGMENT CORPORATION .....	00
TRANE COMPANY, THE .....	00
TUTTLE & KIFT, INC. ....	4th COVER
UNION STEEL PRODUCTS COMPANY .....	00
UNITED STATES SAVINGS BONDS .....	71
UNITED STATES STEEL CORPORATION .....	15
VERON ALL-STEEL PRESS COMPANY .....	00
VITREOUS STEEL PRODUCTS CO., THE .....	14
VITRO MANUFACTURING CO., JERVIS B. ....	00
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## Spraying technique ...

→ from Page 70

the spray gun. Standardizing on the quantity of material being fed to each operator controls the amount of material being sprayed. With each operator receiving the same amount of material and using the same atomizing pressure, control of results is then entirely dependent upon the control of spray technique.

Controlling spray technique is by education of supervision and spray personnel. The correct distance of gun from work, the proper movement across the surfaces, and the motion from start to finish over the product are highly important to the quality of the finish and the cost of finishing.

These controls have been instituted in many of the plants applying organic finishes. The majority are familiar with the requisites for a high quality, economical finish and strive to set their standards to assure just that.

*Press Finish*

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